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Areawide Waste Treatment and Water Quality Management Planning. Appendix B-6 Land Use in the 208 Area

Greater Egypt Regional Planning and Development Commission,
Carbondale, IL

Prepared for

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Areawide Waste Treatment and Water Quality Management Planning

PB 297034

Land Use in the 208 Area

Appendix B-6

Franklin, Gallatin, Hamilton, Hardin,
Jackson, Jefferson, Perry, Pope, Saline,
and Williamson Counties, Illinois

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Areawide Waste Treatment and Water Quality Management Planning

5

Land Use in the 208 Area

Appendix B-6

Franklin, Gallatin, Hamilton, Hardin, Jackson, Jefferson, Perry, Pope, Saline, and Williamson Counties, Illinois

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November 1978

Michael P. Mauzy
Acting Director
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

Dear Mr. Mauzy:

The Commission is pleased to transmit Appendix B-6, Land Use in the 208 Area of the 208 Areawide Waste Treatment and Water Quality Management Plan for Southern Illinois. The plan and this document cover the ten Illinois Counties of Franklin, Gallatin, Hamilton, Hardin, Jackson, Jefferson, Perry, Pope, Saline, and Williamson.

This technical report is an integral part of the Southern Illinois Water Quality Management Plan that is designated to meet the contract requirements of Federal Grant Number P005225-01 under the U. S. Water Pollution Control Act Amendments of 1972, as administered by the United States Environmental Protection Agency.

We trust this submittal of this report, as well as the others comprising the plan, will provide the basis for certification of the plan and continued designation of this area.

Sincerely,

A. S. Kirkikis

A. S. Kirkikis
Executive Director

ASK:db

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United States Environmental Protection Agency

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Chapter 1

BACKGROUND

Public Law 92-500

The Water Pollution Control Act Amendments of 1972, Public Law 92-500, provided numerous and varied mechanisms to states, regions, and municipalities to improve water quality. Section 208 of the Act provided for the designation of areawide agencies "for the purpose of encouraging and facilitating the development and implementation of areawide waste treatment management plans."[1]

"The Greater Egypt Regional Planning and Development Commission (GERP&DC), in conjunction with the Southeastern Illinois Regional Planning and Development Commission (SIRP&DC), and supported financially by the Illinois Environmental Protection Agency (IEPA), prepared a report identifying basic complex water quality management problems within the ten-county area consisting of Franklin, Gallatin, Hamilton, Hardin, Jackson, Jefferson, Perry, Pope, Saline, and Williamson Counties, Illinois. Based upon this study, the support of the local governments, and the results of a public hearing, the Governor of Illinois, in April 1975, designated the ten Counties as a 208 planning area. Greater Egypt Regional Planning and Development Commission was designated as the lead 208 agency responsible for undertaking the development of required water quality management planning; and Southeastern Illinois Regional Planning and Development Commission was delegated to assist with 208 planning in the five eastern counties of the 208 planning area."[2]

Included within the provision of Section 208 of the Act are the following items which must be a part of any plan prepared under this section of the Act.

Public Law 92-500 Section 208 (2)

> "(F) a process to (i) identify, if appropriate, agriculturally and silviculturally related nonpoint sources of pollution, including runoff from manure disposal areas, and from land used for livestock and crop production, and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources.;

> "(G) a process to (i) identify, if appropriate, mine-related sources of pollution including new, current, and abandoned surface and underground mine runoff, and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources;
>
> "(H) a process to (i) identify construction activity related sources of pollution, and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources; ..." [3]

Public Law 95-87

The Surface Mining Control and Reclamation Act of 1977 (PL 95-87) contains several important provisions which concern land use and water quality. Section 522 of the Act provides for the designation of areas which are considered unsuitable for surface coal mining operations.

> "...a surface area may be designated unsuitable for certain types of surface coal mining operations, if such operations will-
>
> (A) be incompatible with existing State or local land use plans or programs; or
> (B) affect fragile or historic lands in which such operations could result in significant damage to important historic, cultural, scientific, and esthetic values and natural systems; or
> (C) affect renewable resources lands in which such operations could result in a substantial loss or reduction of long-range productivity of water supply or of food or fiber products, and such lands to include aquifers and aquifer recharge areas; or
> (D) affect natural hazard lands in which such operations could substantially endanger life and property, such lands to include areas subject to frequent flooding and areas of unstable geology."[4]

The anticipated increase in mining activities in the 208 area make the provisions of this section an important tool in limiting mining operations in specific areas within the ten counties. It is possible that lands within the 208 area could be designated as unsuitable for surface mining operations under each of the four provisions of the act, but those with the greatest impact on water quality will be the protection of water supplies and incompatibility with local land use plans (if such plans have been prepared and adopted for the area concerned.)

Section 515 of the Act contains performance standards for the reclamation of land to be surface mined. Included among these standards is that the postmining land use must be decided upon before the permit for mining is granted.

> "...the regulatory authority may grant a permit for surface mining operation ... where-
>
> (A) after consultation with the appropriate land use planning agencies, if any, the proposed postmining land use is deemed to constitute an equal or better economic or public use of the affected land, as compared with premining use;
> (B) the applicant presents specific plans for the proposed postmining land use and appropriate assurances that such use will be-
> (i) compatible with adjacent land uses; ...
> (C) the proposed use would be consistent with adjacent land uses, and existing State and local land use plans and programs;...[5]

Section 515 also outlines specific minimum soil removal, storage, replacement, and reconstruction activities which must take place when prime farm land are to be surface mined.

Additional work needs to be done in the formulation and adoption of land use plans and programs within the ten county area if the area is to exercise the powers available to it under PL 95-87, and PL 92-500.

Much of the preliminary work in determing lands not suitable for surface coal mining operations pursuant to PL 95-87 has begun through a general identification by soil and water conservation districts of potential lands.

The Greater Egypt Counties of Franklin, Jackson, Jefferson, Perry and Williamson and the Southeastern County of Pope have adopted land use plans, the remaining Southeastern Counties of Hamilton, Hardin, Gallatin and Saline have not. The commissions of Greater Egypt and Southeastern have developed and adopted land use plans and policies. Franklin, Jackson, Jefferson, Perry, Pope and Williamson Counties need to update their current land use plans, and Gallatin, Hamilton, Hardin and Saline Counties need to adopt land use plans.

Use of these proposed and adopted land use plans should help provide a sound basis for determing lands not suitable for surface coal mining operations.

The Illinois Department of Conservation has designated lands that have historic and cultural values. Under current enabling legislation, zoning districts may be established by municipalities having special, hisotrical, community or aestheic interest (I.R.S. 24 §11-48.2). Other enabling legislation provides that counties may purchase and hold real estate for the purpose of preserving forests and historical landmarks (I.R.S. 34 §304).

Use of the Department of Conservation's designations and local government enabling legislation should be maximized in determing lands not suitable for surface coal mining operations due to the incompatible impact on fragile or historic lands.

The dependence of the region on (surface) Public Water Supplies, which includes impoundments, rivers and channels, necessitates the careful evaluation of the impact of surface coal mining operations on the watersheds of public water supplies, and the future productivity of prime agricultural lands. Further evaluation must be given to the impact folly assessed to the watersheds of public water supplies and other waters that meet EPA standards, and the future productivity of Prime Agricultural lands designated by the Soil Conservation Service when determing lands unsuitable for surface coal mining operations.

Natural hazzard areas due to unstable geology have been determined by the Illinois State Geological Survey. Those prone to flooding have been identified by the Department of Housing and Urban Development. The Illinois Department of Transportation currently is preparing flood hazard maps. Use of these resources should be maximized in designating lands unsuitable for surface coal mining operations due the adverse affects that may result from natural hazard lands.

It is recommended that all of the mechanisms described above should be utilized and evaluated. Their influence upon lands designated unsuitable for surface coal operations should be maximized by the counties and municipalities. Further, in the absence of county action, either due to public opposition or in process actions, municipalities are recommended to utilize the maximum extra-territorial jurisdiction granted under state statutes and designate all lands necessary (within the extra-territorial boundary) as unsuitable through zoning.

The purpose of this report is to examine the subject of land use within the ten county 208 area as it relates to water quality. The relationship between land use and water quality will be examined. Land uses within the area will be reviewed. Projections of future land uses will be presented. Mechanisms available to control land use will also be presented.

Land Use And Water Quality

The use of the land within a watershed has a direct bearing on the quality of the water in a lake or stream. Certain land uses are likely to yield certain pollutants while other uses in the area are likely to yield other pollutants. The water quality within a reservoir is dependent upon the water that flows into it from its tributary streams. The water quality of that tributary is dependent upon the quality of the water flowing into it from the areas along its banks.

This report is concerned with nonpoint source water pollution. This is pollution whose origin is a broad geographical area such as a farm or mining area. Point source pollution refers to pollution which can be traced to a specific pipe, opening, or discharge. Pollution from urban areas with waste treatment facilities are considered point sources of pollution. This type of pollution is to be controlled through proper facilities and treatment, and not through land use controls.

A simplification of the nonpoint source pollution process indicates the relationship involved. As precipitation falls and hits the ground it can dislodge soil or other pollutants. As the water flows across the land additional pollutants are picked up. This polluted water eventually will flow into a stream, river or lake. The rainfall transports whatever pollutants may be on this particular land. Different land uses create different pollutants. Therefore, the pollution resulting will differ. As the land use of a particular tract changes, so will the potential pollutants, although pollution may carry over from previous land uses.

Pollution from land devoted to agriculture will differ according to the type of agricultural activity involved. Pollutants from crop-lands are likely to include significant amounts of sediment and lessor amounts of fertilizers and pesticides. Orchards with proper ground cover will contribute significantly smaller amounts of sediment, but pesticides used specifically in orchards are a potential source of pollution distinct from other agricultural activities. Feed lots produce large quantities of animal wastes which, if not properly handled, represent an additional form of pollution.

Coal mining activities in the 208 area are an additional source of nonpoint pollution. Acid mine drainage is a distinct type of pollution which is a serious problem in areas which have been or are being mined. However, this problem is specific to mining areas and is unlikely to be a problem in streams not receiving mine wastes.

It should be emphasized that the manner in which an activity is carried out can greatly reduce the potential pollution from that activity. Farmers and mine operators can take measures which will reduce the pollution from these activities. These measures are discussed in other 208 publications, specifically, Appendix B-2, Pollution Sources: Agriculture.

Current Land Uses In The 208 Area

Efforts in the area of land use planning have been an integral part of the work activities of both the Greater Egypt Regional Planning and Development Commission and the Southeastern Illinois Regional Planning and Development Commission for several years. The identification of current land uses within the ten county area for water quality purposes is built upon those efforts.

The following categories were identified for Areawide 208 land use planning activities:

1. Municipal and rural non-farm residentail concentrations
2. Industrial (located outside municipalities)
3. Commercial and Public/SemiPublic (except National Forest)
4. Agriculture
5. Wooded (public and private)
6. Water (surface water)
7. Surface mine - active
8. Surface mine - inactive
9. Surface expression of underground mine - active
10. Surface expression of underground mine - inactive

for the purpose of general tabulation for the ten county area the following categories were utilized:

Urban (includes 1,2, and 3 except when public and semipublic was obviously used as agriculture or wooded)

Rural Non Farm Residential

Agriculture (4)

Forest (5)

Water (6)

Mine (7, 8, 9, and 10)

The following table summaries the current land uses within the ten county 208 area.

Table 1
1975 EXISTING LAND USE - CONDENSED CATEGORIES IN ACRES AND BY PERCENT OF COUNTY TOTAL

	Urban	RNF	Agriculture	Forest	Water	Mine	Total
Franklin							
Acres	9268	3917	189551	59259	12890	2365	277250
%	3.4	1.4	68.4	21.4	4.5	.9	100
Gallatin							
Acres	1208	604	167168	39947	4344	2041	215312
%	.6	.3	77.6	18.5	2.0	1.0	100
Hamilton							
Acres	1313	656	248010	37520	805	0	288304
%	.5	.2	86.0	13.0	.3	0	100
Hardin							
Acres	770	385	57239	48862	839	668	108762
%	.7	.4	52.6	44.9	.8	.6	100
Jackson							
Acres	10157	7552	221651	127885	10031	7263	384539
%	2.6	2.0	57.6	33.3	2.6	1.9	100
Jefferson							
Acres	6895	5770	267823	68341	9418	3286	361533
%	1.9	1.6	74.1	18.9	2.6	.9	100
Perry							
Acres	4650	2839	192600	57976	1005	25691	248761
%	1.6	1.0	67.6	20.4	.4	9.0	100
Pope							
Acres	636	318	100567	137815	2073	22	241431
%	.2	.1	41.7	57.1	.9	0	100
Saline							
Acres	3841	1921	185333	36648	5698	10885	244326
%	1.6	.8	75.8	15.0	2.3	4.5	100
Williamson							
Acres	11189	4302	185333	36648	12993	22608	280014
%	4.0	1.5	51.7	30.1	4.6	8.1	100
Region							
Acres	49927	28264	1774574	698543	60096	74829	2686232
%	1.9	1.0	66.1	26.0	2.2	2.8	100

Source: Land use elements for HUD 701 Comprehensive Planning, 1978
Greater Egypt Regional Planning and Development Commission
Southeastern Illinois Regional Planning and Development Commission

Projection of Future Land Uses

As a part of the water quality planning process forecasts of future land uses within the area were made. It was generally assumed that land usage would remain the same over time unless a specific factor was likely to cause a change in usage. The forecasts were made within the context of existing economic and demographic projections for the area. Generally the forecasts indicate increases in the amounts of land in urban areas, following existing growth patterns; an increase in the land affected by mining; and a decrease in land area used for agriculture. It should be noted that surface mining is dynam'c, and may affect a large area over the projection period, but at any one time will affect a smaller land area, as land is converted to surface mines, mined, and returned to other uses.

Local Land Use Controls

There are four basic land use control mechanisms which are available to local units of government--land use plans, zoning ordinance, subdivision ordinance, and building code ordinance. These mechanisms may be used separately, but provide more effective results when used together.

A land use plan may be prepared by a county or municipality which has created a planning commission. The plan is intended to serve as a guide to the future development of the area concerned. A municipal land use plan might indicate areas to used for residential, commercial, industrial, recreational, and other public uses. A land use plan is not binding upon future development.

A zoning ordinance limits the types of activities or development which may occur within specific sections of a jurisdiction. A jurisdiction is divided into zoning districts and each class of districts has its own list of permissible activities. An example is that an R-1 zoning usually indicates single family dwellings are intended for an area. Additional uses such as schools, churches, and parks may be permitted, but multi-family, commercial, and industrial uses are prohibited. A zoning ordinance is binding upon the land owner and/or developer, but it may be changed by the governing body on a case by case basis.

A subdivision regulation is usually applicable to all new housing developments over a certain size within the adopting government's jurisdiction. The regulation is an ordinance which may cover any number of a broad range of factors including minimum lot size, setbacks, road, street and standards, easements for utilities and land to be set aside for public uses.

A building code ordinance requires all new construction to be in accordance with certain standards. These standards may be of a specification or performance nature. A specification code provides in great detail materials to be used and the manner of their installation. A performance code provides the builder more discretion in the manner of construction to achieve a desired objective. Several model codes are available for inspection and adoption by units of government.

In addition, both taxation and public ownership are potential controls at the disposal of local governments.

Federal and State Land Use Authorities

Numerous state and federal agencies are responsible for a large number of programs which can affect land use. Federal agencies whose programs can affect land use or water quality include:

U. S. Environmental Protection Agency
U. S. Department of Interior
U. S. Department of Agriculture
U. S. Department of Transportation
U. S. Internal Revenue Service
U. S. Corps of Engineers
U. S. Department of Housing and Urban Development
U. S. Department of Commerce
U. S. Small Business Administration

State agencies with programs which can affect land use include:

Environmental Protection Agency
Pollution Control Board
Institute for Environmental Quality

Department of Conservation
Department of Public Health
Department of Mines and Minerals
Department of Agriculture
Department of Transportation

Summary

Each of the issues which have been briefly discussed will be examined in greater detail in the body of this report. Land use controls are an available mechanism to improve water quality, but such controls are only a small portion of the actions which may ultimately be needed in order to achieve the objective of fishable and swimable bodies of water within the ten county area.

FOOTNOTES FOR CHAPTER 1

[1] Public Law 92-500, Section 208 (a).

[2] GERP&DC, Pollution Sources: Agriculture, 1978, p. 1-1.

[3] Public Law 92-500, Section 208 (b) (2).

[4] Public Law 95-87, Section 522 (a) (3).

[5] Public Law 95-87, Section 515 (c) (3).

Chapter 2

RELATIONSHIP OF WATER QUALITY TO LAND USE

This chapter describes the relationship of water quality to land use by indicating the types of pollution likely to occur from each of the major land use categories. Although point sources of pollution will be discussed, it should be noted that nonpoint sources of pollution are the major problem under consideration.

The activities that take place on the land within the 208 area could theoretically be carried out without negatively impacting water quality within the ten-county area. It could be argued that areas devoted to urbanization, agriculture and mining can function within a watershed and not impact water quality. However, the simple truth is that these activities do impact water quality. The outlet pipes of municipal sewage treatment plants are often sources of pollution to the body of water receiving the wastes. Pollution is greatly decreased, but unfortunately, it is not always eliminated. The water qulaity impact of mining is often more easily recognized, while the impact of erosion from cropland may appear less significant than it is.

The impact of any activity upon water quality can be greatly reduced if that activity is undertaken in a manner which seeks to minimize water quality degradation to the greatest extent possible. These Best Management Practices (BMP's) should be used wherever feasible and practical. However, despite the most conscientious efforts, some water pollution will occur, and the specific nature of this pollution will be dependent upon the activity taking place on the site.

Point source pollution is usually caused by effluents which drain from an outfall pipe, headwall or other discharge facility, directly into a stream or into a ditch or drainageway which eventually discharges into a stream. This effluent discharge is usually the main polluter at the point where it enters the stream; however, it can, if it runs for a distance over the land, also cause an erosive ditch or absorb surface chemicals which may add to its effect on stream water quality. In the 208 area the major sources of point source pollution are effluent discharges of municipal wastewater treatment facilities and coal mining preparation plants. A few isolated industries and livestock feedlots also exist in rural areas which are not connected to municipal systems. In almost all cases the most effective manner of reducing point source pollution is more effective collection and treatment of the wastewater prior to its discharge into a water course.

Nonpoint sources of pollution originate from relatively broad geographic areas and are by nature more difficult to specifically identify than are point sources. Unfortunately, this difficulty that is encountered does not lessen the serious impact that nonpoint source pollution can have on water quality. The pollution from a single acre of land in agricultural production may appear too small to be a matter of concern until one takes into account that over half of the land area of the ten counties is used for agriculture. Some important aspects of nonpoint source pollution are that they are often rainfall dependent, that is, the more rain that falls and the harder it falls, the greater the level of pollution; the mechanisms which will limit nonpoint source pollution often do not appear to have the direct linkage to improved water quality that measures to limit point source pollution have; and in order to be most effective, these measures must often be undertaken by large numbers of individuals over a broad geographic area. Within the ten-county 208 area the primary causes of nonpoint source pollution are agricultural activities, mining, and rural residential developments which are not connected to municipal sewage treatment systems.

Agriculture

Overview

Within the land use category of agriculture, several different types of agricultural production exist. Within the ten-county 208 area, major uses for agricultural land include row crop production, grassland (including pastureland), orchards and feedlots. Each of these specific agricultural uses has its own set of potential water quality problems. Erosion and rainwater runoff transport agricultural pollutants into the area's waterways.

Erosion is the key factor in the agricultural water pollution process.

The relationship of soil erosion to water qulaity is a basic one--the movement of soils into surface waters. Although erosion is a naturally occurring process, many modern agricultural practices accelerate the process and subject the soil to significantly greater levels of erosion than would have occurred naturally. The sediment which is the result of the erosion process is a pollutant of area streams and lakes. The downstream effects of excessive quantities of sediment include obstructing drainage, filling reservoirs, making streams turbid, and the transporting of other pollutants.

Modern agricultural activities introduce numerous chemical compounds into the soil which may become pollutants to streams flowing through the agricultural area. These potential pollutants from fertilizers, pestidices, and animal wastes can be carried into waterways by erosion or rainwater runoff (in addition to carrying pollutants, runoff can cause additional erosion). Many pollutants cling to soil particles and will move with the eroding soil into waterways.

The primary factors which contribute to the erosion process include rainfall, soil type, slope, cropping and conservation practices utilized. These basic factors are included in the Universal Soil Loss Equation, a technique utilized to estimate the amount of erosion likely to occur from a specific parcel of land. As an additional part of the 208 planning process areas of critical erosion have been identified. These two techniques assist in determining where erosion control efforts are most needed and which specific water management practices would be most beneficial. Water management practices available to the agricultural community can greatly reduce the amount of erosion from a parcel of land. Best Management Practices for the handling and application of fertilizers, pesticides and animal wastes can greatly reduce the amounts of these pollutants flowing into waterways.

Cropland

Within the agricultural land use category, erosion is greatest from land which is under row crop production. The removal of the protective ground cover of vegetation exposes the soil to the eroding forces of water and wind. In the ten-county 208 area cropland erosion was found to be the greatest source of sediment in lakes and streams. In addition, the total number of tons of cropland erosion between 1967 and 1975 has increased in at least eight of the ten counties (one county did not report in 1967). The least amount of erosion occurred in Gallatin County which contains (generally) level to gently rolling land and is bordered on the east by the Wabash and Ohio Rivers. Gallatin County produced 413,000 tons of cropland erosion in 1967, and the amount increased to 656,000 tons in 1975. The county with the greatest erosion was Jefferson, which contains some gently rolling land and some sloping and hilly terrain. In Jefferson County the total tons of cropland erosion rose from 1,606,000 tons in 1967 to 1,791,000 tons in 1975.

Table 2 indicates the changes in cropland and erosion, and the estimated cost of this erosion for the ten counties in the 208 area.

Land which is utilized for row crops receives a majority of the commercial fertilizer used within the 208 area. These fertilizers usually contain nitrogen, phosphorus, and potassium. These chemicals are used individually and in numerous combinations. Unpublished data from the Illinois Department of Agriculture indicates that in 1976, 47,876 tons of fertilizer containing these three chemicals were used in the ten-county area. Proper use of these fertilizer is not necessarily a threat to water quality, but improper use or the use of excessive quantities may cause water pollution--accelerating the eutrophication process of lakes and posing a health hazard.

The use of pesticides and herbicides to control unwanted insects, mites, weeds, and grasses is also most prevelane on land used for row crop production. A wide variety of chemicals and chemical types are contained in the large selection of commercial pesticides and herbicides available to area farm operators. Some of these chemicals retain a portion of their potency after they have reached area waters. Residues from some pesticides, primarily those in the organochlorine class, accumulate in aquatic life. These chemicals also may accumulate up the food chain and can cause a health hazard to humans consuming sufficient quantities of fish containing these chemicals.

Grassland (Pasture)

Grasslands within the 208 area are generally used for hay or pasture, or are the result of a land reclamation process. Pollution of the area's streams from grassland and pasture is minimized because the ground cover vegetation is left in place, protecting the soil and minimizing the effects of the erosion forces. Pollution may result if overgrazing occurs and this protective cover is removed, if

Table 2
AREAWIDE CROPLAND CHANGE, TOTAL EROSION AND COST OF EROSION, 1967-1975

	Cropland Acreage Change 1967-1975	Total Erosion (tons)		Cost of Erosion (dollars)	
		1967	1975	1967	1975
Franklin	-7,600	1,101,000	1,059,000	6,882,000	6,577,000
Gallatin	15,000	413,000	656,000	2,352,000	4,290,000
Hamilton	N.A.	N.A.	902,000	N.A.	2,261,361
Hardin-Pope	-3,200	749,000	739,000	2,591,000	2,461,000
Jackson	35,300	1,157,000	1,410,000	5,778,000	8,624,000
Jefferson	22,900	1,606,000	1,791,000	10,258,000	11,993,000
Perry	-59,100	996,000	1,044,000	5,960,000	4,326,000
Pope	(Included with Hardin)				
Saline	-10,800	666,000	675,000	3,441,000	3,172,000
Williamson	-2,100	867,000	865,000	3,927,000	3,826,000

Source: GERP&DC, Appendix B-2, Pollution Sources: Agriculture, Chapter 2, 1978.

if excessive quanities of animal waste are deposited and are washed off into streams, or if excessive quantities of fertilizer or pesticides are used.

Orchard

Continuous sod cover is commonly practiced in the apple and peach orchards of the area. This sod cover reduces the possibility of pollution from these parcels because erosion is minimized. However, the use of pesticides is more intensive in an orchard operation than in row crop production. The inorganic pesticides used by orchardists, such as arsenic, lead, copper, zinc and mercury, are virtually non-degradable. If land which has been used as an orchard is converted to row crop production and the soil is exposed to erosion, water pollution is likely to occur. Residues from these pesticides (including DDT, high concentrations of which are still a problem in orchard soils) remain in the top soil for many years, and erosion will carry them into area waters.

Feedlots

Feedlots raise large numbers of animals within a relatively small confined area. The high livestock density produces large quantities of animal waste far in excess of the land's ability to absorb and assimilate it safely. Systems to collect, store and dispose of these wastes must be utilized in order to prevent water pollution. Failure to handle these wastes properly can result in excessive quantities of nitrogen, salt and fecal coliforms in streams and lakes. Although few large feedlots are operating within the 208 area, large numbers of animals are grain fed in relatively small areas on combination grain/livestock farms.

Additional information on pollution from agricultural activities may be found in the 208 report entitled Pollution Sources: Agriculture, Appendix B-2

Mining

Although other minerals are extracted from within the 208 area, mining is generally thought of as coal mining. While both underground and surface mines have been and continue in operation, surface mines are by far the most prominent in terms of land use. The major mining pollution generator is "acid mine drainage (which) is a mixture of sulfuric acid and iron and aluminum salts which arise from the oxidation of pyritic materials associated with coal and mineral deposits."[1]

Coal mining often causes degradation of water quality to the surrounding area. The variability of mining conditions and rainfall patterns cause pollutant discharges from mining activities to vary widely. Such variability of these factors requires careful examination of many parameters such as soils, mining methods and coal seam conditions. The following is an excerpt from a report prepared by a consultant to the 208 project, Energy and Environmental Analysis, Inc.

> "Coal mining by its vary nature upsets the balance of nature, often causing degradation of water quality to the surrounding area. Due to the variability of mining conditions and rainfall patterns, pollutant discharges from mining activities vary widely, necessitating careful examination of many parameters such as soils, coal seam conditions, and mining methods...
>
> "Pollution due to coal mining emanates primarily from three sources: runoff from the affected or spoil areas (surface mining only), runoff from waste or "gob" piles, and runoff from improperly operated or abandoned slurry ponds. During surface mining operations large volumes of earth and rock or spoil are removed to expose the coal seams being mined. Mining techniques using area mines such as those found in Southern Illinois, call for spoil to be piled in a continuous pile adjacent to the trench or pit, in the form of a large mound or spoil bank. The spoil bank is exposed to the atmosphere and precipitation and is often subject to considerable runoff and soil erosion. Additionally, spoil in some areas can contain significant levels of various pollutants especially acid compounds. Therefore, precipitation falling on an acidic spoil bank or affected area can cause acid runoff to the adjacent waters...
>
> "During the natural formation process of coal, many impurities are entrapped within the coal seam and its surrounding layers. Primary impurities or pollutants include: metals,

chemical salts, and pyritic compounds. Most coal that is mined must undergo a cleaning operation to remove some of the dirt and impurities present within the coal seam as well as any of the materials surrounding the coal seam that were picked up during the mining process. Impurities form the reject or unmarketable portion of the materials removed in the mining operation. Modern coal cleaning processes remove impurities in two steps: removal of the large materials commonly referred to as "refuse" or "gob", and wet floatation and removal of the fine reject material, usually 20 mesh or smaller, in the form of slurry which is then piped to an enclosed lagoon or impoundment. Disposal of refuse varies with the type and extent of the mining operation. Typically coal extracted during a modern operation is trucked to a preparation plant, cleaned and the resultant gob returned to the open strip pit for burial with the spoil...

"Unfortunately, many surface mine operators in the past did not follow this practice, instead opting to simply pile the "gob". Piles coupled with oxygen in the air, causes oxidation of the entrapped pyritic compounds forming concentrated sulfuric acid which then leaches out of the piles and enters adjacent waters through overland runoff and seepage. The acid mine drainage thus formed also leaches significant quantities of iron and other compounds, often causing severe water quality degradation in the surrounding area. Continuous decomposition of the clay, shale, and sandstone entrapped in "gob" results in high degrees of erosion which then expose new pyritic surfaces to the atmosphere for continued acid production. This process forms a continuous cycle of oxidation, leaching, erosion and finally, renewed oxidation, resulting in a seemingly inexhaustible and continuous source of acid production. The problem with underground mining activities is even more complex in that "gob" generated from such operations is typically disposed of by piling the waste in the nearest adjacent field, since most often no large disposal sites are readily available nearby...

"Slurry lagoons associated with coal cleaning operations present a similar though less severe environmental problem.

"The lagoons contain fine waste material from preparation plants and can be composed of as much as 50% coal, expecially from older operations. The balance of the slurry contains similar materials as "gob" thus yielding an additional significant source of acid mine drainage, acid runoff from mine impacted areas or refuse piles often is neutralized by naturally-occurring alkaline substances especially, limestone. The neutralization process when it occurs, results

> in high concentrations of sulfate compounds in the receiving water body and precipitation or settling of the entrained dissolved iron in the form of the familiar "yellow boy." This process leaves a coating on stream beds, smothering bottom dwelling organisms and reducing the oxygen level available for support of aquatic life...
>
> "Presently there are roughly 274 individual active or abandoned "gob" and slurry disposal sites within the 208 area. Acid runoff from these sites has caused severe water quality degradation of hundreds of river miles within the area, making them void of all aquatic life as well as unuseable for public water supplies..."[2]

The Greater Egypt Regional Planning and Development Commission contracted with the consulting firm, Energy and Environmental Analysis, Inc. to conduct studies which address the problem of acid mine drainage in the 208 area. The mine waste program was developed to address the problem and to develop a rationale for restoration of the area's waterways to acceptable quality levels. Mine waste problems in the Big Muddy and Saline River Basins were the focus of the studies.

Rural Sewage Systems

The most prominent private sewage disposal system type in use in the 208 area is a septic tank with a percolation field. These systems serve individual dwellings or businesses and their installation and maintenance are the responsibility of the contractor and property owner. "In the 208 area such systems are a source of surface and groundwater pollution. Two factors inherent to the ten-county area have much to do with this pollution problem. These factors are the types of soil found over most of the 208 area and the manner in which population concentrations have developed."[3]

Private wastewater treatment systems must be installed when a home or a business facility is constructed in an area which is not serviced by a municipal or other treatment facility. This would include many small municipalities and unincorporated areas as well as developments strung along the highways of the area. The availability and extension of municipal and public water district waterlines contributes to the consequences (the most obvious is increased water usage) that compound the seriousness of the situation. In many older residences in the area, small minimal septic tank systems were installed to replace outhouses. The development patterns within the 208 area have demanded a greater use of rural sewage systems than would have been environmentally desirable. This situation is examplified by the existence of the many subdivisions platted within the Region, not having sewage collection systems with potential densities of up to 7.25 dwelling units per gross acre. There are instances in the Region where this density has been exceeded when the protective covenants were violated.

The water quality consequences of the use of these systems are further compounded because the soils found within the ten counties are not well suited to absorbing and assimilating the wastes which pass through these systems. "With few exceptions, the soils of the 208 area are incapable of absorbing great amounts of water...septic materials often follow land contours along the surface of the shallow impermeable fragipan and come to the surface at one or several points and enter breaks in the crevassed limestone and from thence enter the groundwater."[4]

Many of these problems could have been avoided if subdivision and developments had been required to meet sewage disposal standards through the municipal and county approval process.

Industrial (Outside Municipalities)

The industrial land use sites located outside municipalities contain industrial plants which can produce point source water pollution. Such point source pollution from industrial effluent discharge is a potential polluter of streams and lakes in the same manner as municipal discharges. Thus, industries located in non-municipal areas must either maintain individual treatment facilities which meet the state effluent discharge standards, or be linked with a system that does.

Commercial (Outside Municipalities)*

Commercial land use found in small municipalities without collection and treatment systems are almost all very small commercial enterprises, but they must maintain individual wastewater facilities. The commercial enterprises found outside municipalities must also maintain such individual systems as approved septic tanks with adequate subsurface drainage fields or sewage lagoons. An exception to this would be an instance of a nearby municipality or sanitary district agreeing to accept the wastewater of a commercial enterprise. Wastes from commercial enterprises are primarily sewage. The problem of rural residences with individual systems would apply to this land use as well.

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*Includes public and semi-public, except forest.

A large commercial shopping center (such as the University Mall in Carbondale) development in a rural, unincorporated part of the 208 area would require a more sophisticated treatment system.

Urban

The water pollution resulting from urban areas is considered to be primarily a point source pollution problem. The answer to this problem is in the proper collection and treatment of wastes. Nonpoint source water pollution may result from urban areas through storm water runoff.

Wooded (Public and Private)

All forest land - commercial, harvested, federal forest land (Shawnee National Forest) and smaller tracts of woods - are included in the Wooded Land Use category.

Since the smaller tracts of woods in the 208 area differ considerably in size and degree of silviculture activity, the following statements should be taken in a general way as they apply to the holistic term "Wooded Land Use."

Water pollution from wooded land use, in the 208 area, is considered to be almost entirely of the nonpoint source variety. Little, if any, stream or lake pollution can be attributed to the few point source facilities which exist in the Shawnee National Forest. Further, nonpoint source pollution from "wooded land use" is considered to be relatively small, insignificant, when compared with mining or agriculture, or with all point sources such as municipal and industrial waste.

Well stocked, well managed forest land can be remarkably resistant to erosion. Relatively intense rainfall can be absorbed without much runoff by some forests with good tree cover and a forest land cover composed of leaves, decaying twigs, etc. Conversely, if forests are devastated by disease or wildfire, they can become highly susceptible to erosion. Further, the harvesting of trees from a forest can create erosion conditions. Good management of silviculture practices can minimize the effects of timber harvesting.

Based on the results of an assessment by the Forestry Subcommittee of the Illinois Task Force on Nonpoint Sources of Pollution, there are four general changes which may occur in water bodies as a result of man's activities within a forest. They are, as follows:

1. An increase in the load of suspended solids or solids carried by or contained in the water flowing within or out of the forested area.

2. An increase in the temperature of the water flowing within or out of the forested area.

3. An increase in the concentration of dissolved solids of nutrients carried by or contained in the water flowing within or out of the forested area.

4. An increase in the amount of organic matter constituents carried by or contained in the water flowing within or out of the forested areas.[5]

In a summary table that illustrates the general areas of forestry activity which could potentially affect water quality, the work group listed the following items: forest management planning, road systems, drainage systems, logging systems, streamside management, site disturbance, pesticide use, fertilizer use, fire prevention and control, livestock use in forests, and maintaining forested lands.[6]

In the 208 area the above items are well controlled by the U.S. Forest Service; and most items would either not produce more than a temporary problem or would not be applicable to small wooded tracts in the 208 area.

Further reference may be made to the 208 publication, Nonpoint Sources of Water Pollution in the 208 Area, Appendix B-1.

FOOTNOTES FOR CHAPTER 2

[1] USEPA-IEPA 430/9-7-014, "Methods for Identifying and Evaluating the Nature and Extent of Nonpoint Sources of Pollutants," 1973, p. 8.

[2] Energy and Environmental Analysis, Inc., Executive Summary, 208 Area Programs, January 1978, pp. 5-7.

[3] GERP&DC, Rural Sewage Systems and Area Water Quality, March 1978, p. 1.

[4] Ibid, p. 2.

[5] Forestry Work Group, Illinois Task Force on Agriculture, Nonpoint Sources of Pollution, Best Management Practices for the Control of Nonpoint Sources of Pollution Associated with Silvicultural Activities, unpublished, November 15, 1977, pp. 95-96

[6] Ibid., pp. 92-93.

Chapter 3

CURRENT LAND USES

Past Activity

Within both of the cooperating regions undertaking water quality planning in Southern Illinois, there were also land use planning activities ongoing for Housing and Urban Development Comprehensive Planning Activities. The Greater Egypt Regional Planning and Development Commission was fortunate to have been involved in land use planning activities since the early sixties, and as the Commission entered into water quality planning, it had a background of land use information for the Region. In addition to the background information, the staff had already begun to update the land use information through a new survey. In contrast, the Southeastern Illinois Regional Planning and Development Commission, while having addressed land use issues on county levels, had not developed any Regional land use information. The year 1974 brought land use to the top of the planning priorities list for both agencies. The Housing and Community Development Act of 1974 specified that any planning commission receiving planning monies after August 22, 1977 would be required to have already developed an accepted "land use element." Further, 1974 was the year in which the two planning commissions began to look seriously at the possibility of doing extensive waste treatment and water quality management planning in Southern Illinois. It was obvious that land use activities would play a major role in the Water Quality Activities as well as the HUD related planning activities.

208 Land Use Activity

To emphasize the relationship between Comprenhensive Planning and Water Quality planning, the Federal Housing and Urban Development Agency and the Federal Environmental Protection Agency entered into an agreement which requires the compatibility of land use activities between the two programs. The agreement did not state that they would be identical, merely that the activities would not conflict. With this background, the staffs of the two agencies began to review their land use options.

For the land use component of the 208 planning process in the ten-county area one of the earliest considerations was the rationale for, and the selection of, specific land use categories. As a basis for the selection, reasons for distinction of land uses were identified. The reasons, for the ten-county area, are at least three in number. First, land use categories should help to identify urban growth patterns within the Region. This is necessary so that the respective Commissions can more effectively assist their member local governments in fiscal management, resource management and (particularly due to HUD guidelines), identification of housing needs. The urban use category is essentially made up of residential, commercial and industrial land uses. The second reason for land use distinction is to identify natural resources and natural resource utilization. The categories required for this include forests, agriculture, water resources and mineral extraction activities.
The importance in identification of these resources lies in future economic activities and future land use patterns which will be affected by the utilization of the resources. Finally, as an aspect of water quality planning, land use categories should be distinct enough to identify potential sources of water pollution. The areas necessary to be identified for the purpose include urban uses, both inside and outside municipalities. This relates to potential pollution from municipal waste water treatment facilities, or the lack thereof. Rural non-farm residential concentrations need to be identified because of potential pollution from inadequate rural septic treatment. Areas affected by mining activities need to be identified due to potential for acid mine drainage. Finally, agricultural areas need to be identified due to various potential water pollutants derived from agricultural activities.

As mentioned earlier, when the two Commissions intitally became involved in the 208 project, Greater Egypt was already involved in land use activities, and, in fact, was well into a traditional land use survey of existing activities. This status did, of course, influence the identification of particular categories which should be used for 208-related land use activities. Due to the time and budget constraints of the project, a fairly generalized listing of land use categories was developed. These are land uses which could be distinguished through both Regions by methods available. They were compatible with each Region's Comprehensive Planning activities. They met the identified goal of locating areas of potential water pollution for water quality management planning. The first listing was generated prior to preparation of the 208 Interim Report. As the planning process continued, it became evident that certain revisions were necessary, and the categories identified for the Areawide 208 planning activities are listed below.

Land Use for General Mapping for Ten-County Region

1. Municipal and rural non-farm residential concentrations
2. Industrial (located outside municipalities)
3. Commercial and Public/Semi-Public (except national forest)
4. Agriculture
5. Wooded (public and private)
6. Water (surface water)
7. Surface mine - active
8. Surface mine - inactive
9. Surface expression of underground mine - active
10. Surface expression of underground mine - inactive

Land Use for General Tabulations for Ten-County Region

Urban (includes 1 within municipalities, 2, and 3 - except when the public and semi-public was obviously used as agricultural, wooded, or industrial. These uses were determined by review of more detailed county level maps.)

Rural Non-Farm Residential

Agriculture (includes 4)

Forest (includes 5)

Water (includes 6)

Mine (refers to all land affected by mining - includes 7, 8, 9, and 10)

The above listing represents a cohesive coordination of several specific land use categories identified according to two different assessment methods used by two different Planning Commissions. These condensed categories do, however, reflect identification of land use categories in enough specificity to identify potential water pollution sources.

During the planning process, the need for slightly more detail at the Regional level, but within areas smaller than the entire ten counties, arose on two occasions. At one point, staff wished to do a reconnaissance of land use upstream from water quality sampling stations. Essentially, the existing land use categories were adequate, however it was felt that the data might be more meaningful regarding agricultural uses if cropland were separated from pasture and other agricultural uses. For the purpose of this aspect of the study, the categories used were almost the same as the Land Use Categories for general tabulation. The only exception was that agriculture was subdivided into "crop" and "pasture or other." This data was also used in identification of the types of existing land uses expected to be affected by surface mining.

The second occasion for more detailed land use categories was when the consultants, preparing the models for coal mining effects on water quality, needed information on land use within the six "micro-cell" study areas. The additional detail required at this level included, in addition to crop-pasture breakdown, a breakdown within the mine areas of active strip mining, and inactive. Within the inactive, a further breakdown of the following five categories was requested:

ungraded grassy
ungraded deciduous
ungraded brushy
ungraded barren
refuse/gob.

The land use information presented in this ten-county land use report is generally far less detailed than that required for urban land use and development activities; however, it is compatible, as it was condensed from the more detailed data available from each respective Commission. The reader is directed to three other documents for this detail: the _208 Areawide Waste Treatment and Water Quality Management Planning Interim Report_, the _Land Use Data Report for the Greater Egypt Region,_ and the _Regional Land Use Report_ prepared by the Southeastern Illinois Regional Planning and Development Commission.

Methodology

As mentioned earlier, each of the five-county Planning Commissions carried out their respective land use data collection according to their own needs and capabilities (including time and budget). The methods used by the two Commissions are presented below.

The first method described is that of the traditional survey method used by the Greater Egypt Commission. This section of the report (page 31 through paragraph 2, page 46) is reprinted from Land Use Survey and Mapping Techniques and describes the base map system, the classification, and the survey method.

Base Maps

The base maps being used for the land use survey are enlargements of United States Geological Survey topographic maps. The original maps were purchased from the Topographic Division of the U.S. Geological Survey in Rolla, Missouri. These maps are identical to the standard U.S.G.S. quadrangle maps with the following exception: they were printed in black on frosted mylar with the contours omitted.

Sixty-four per cent of the Greater Egypt Region is covered by 7 1/2 minute U.S.G.S. quadrangle maps; the remaining thirty-six per cent is covered by older 15 minute maps. The 7 1/2 minute maps were enlarged from the published scale of 1:24,000 or 1" = 2,000' to the scale of 1:9,600 or 1" = 800'. This is an enlargement of 2 1/2 times. The 15 minute maps were also enlarged to 1:9,600 from the published scale of 1:62,500 or 1" = 5,208', an enlargement of 6 1/2 times.

The Region is covered by 112 numbered sheets at the scale of 1" = 800' (See grid system, Figure 1). Each sheet is equivalent to either the north or south half of a 7 1/2 minute U.S.G.S. map. The 15 minute U.S.G.S. maps became eight sheets at the 1" = 800' scale.

Each enlarged mylar sheet has, at the bottom, a north arrow, scale, sheet number, location grid, and Commission logo. The following is a chart of standard U.S.G.S. information which is delineated on the base maps (except contours).

TOPOGRAPHIC MAP SYMBOLS

VARIATIONS WILL BE FOUND ON OLDER MAPS

Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Unimproved road
Road under construction, alinement known
Proposed road
Dual highway, dividing strip 25 feet or less
Dual highway, dividing strip exceeding 25 feet
Trail

Railroad: single track and multiple track
Railroads in juxtaposition
Narrow gage: single track and multiple track
Railroad in street and carline
Bridge: road and railroad
Drawbridge: road and railroad
Footbridge
Tunnel: road and railroad
Overpass and underpass
Small masonry or concrete dam
Dam with lock
Dam with road
Canal with lock

Buildings (dwelling, place of employment, etc.)
School, church, and cemetery Cem
Buildings (barn, warehouse, etc.)
Power transmission line with located metal tower
Telephone line, pipeline, etc. (labeled as to type)
Wells other than water (labeled as to type) Oil Gas
Tanks: oil, water, etc. (labeled only if water) ● ● Water
Located or landmark object; windmill
Open pit, mine, or quarry; prospect ✕ x
Shaft and tunnel entrance

Horizontal and vertical control station:
Tablet, spirit level elevation BM Δ 5653
Other recoverable mark, spirit level elevation Δ 5455
Horizontal control station: tablet, vertical angle elevation VABM Δ 9519
Any recoverable mark, vertical angle or checked elevation Δ 3775
Vertical control station: tablet, spirit level elevation BM × 957
Other recoverable mark, spirit level elevation × 954
Spot elevation × 7369 × 7369
Water elevation 670 670

Boundaries: National
State
County, parish, municipio
Civil township, precinct, town, barrio
Incorporated city, village, town, hamlet
Reservation, National or State
Small park, cemetery, airport, etc.
Land grant
Township or range line, United States land survey
Township or range line, approximate location
Section line, United States land survey
Section line, approximate location
Township line, not United States land survey
Section line, not United States land survey
Found corner: section and closing
Boundary monument: land grant and other
Fence or field line

Index contour
Supplementary contour
Fill
Levee
Mine dump
Tailings
Shifting sand or dunes
Sand area

Intermediate contour
Depression contours
Cut
Levee with road
Wash
Tailings pond
Intricate surface
Gravel beach

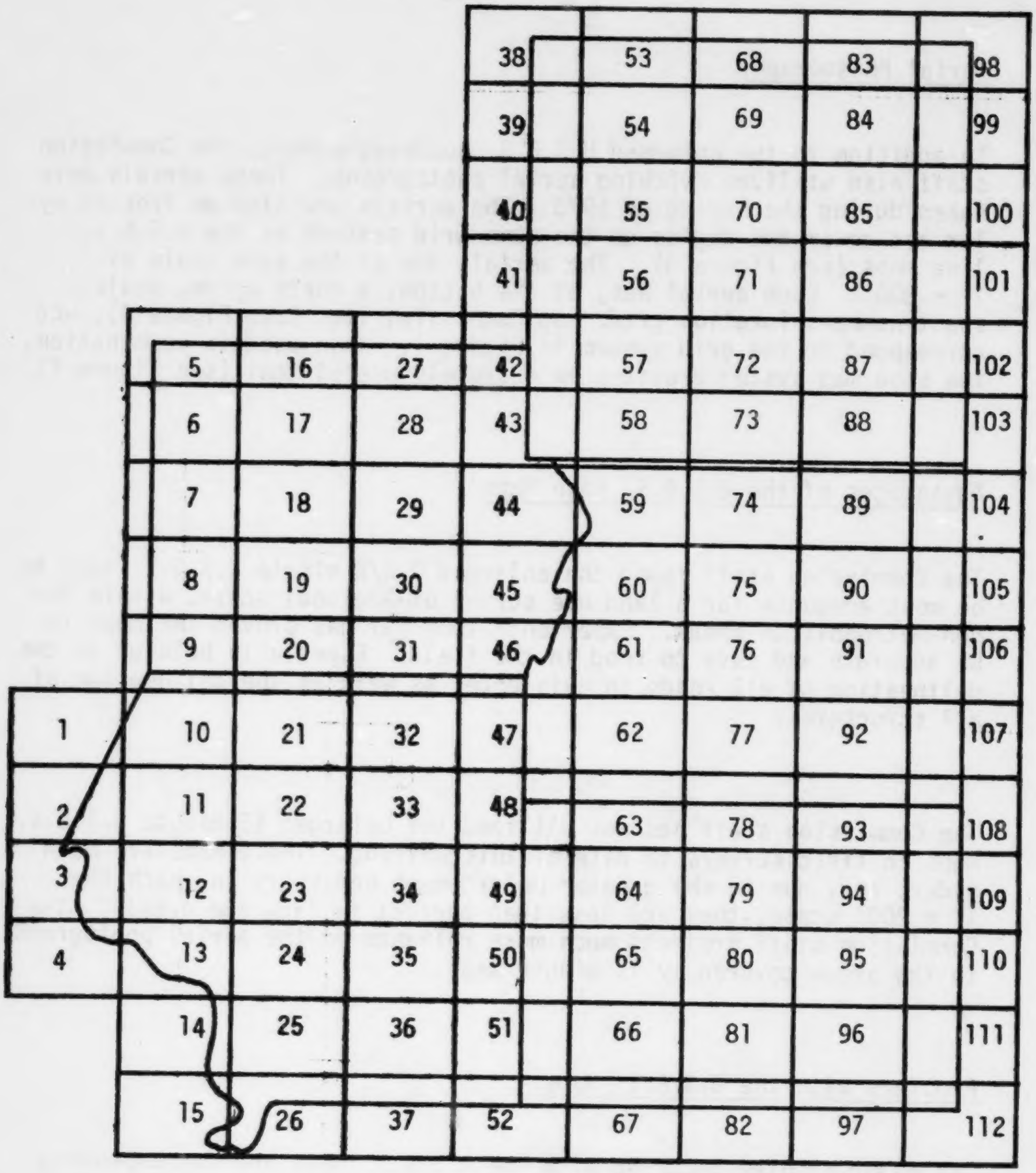
Perennial streams
Elevated aqueduct
Water well and spring
Small rapids
Large rapids
Intermittent lake
Foreshore flat
Sounding, depth curve 10
Exposed wreck

Intermittent streams
Aqueduct tunnel
Glacier
Small falls
Large falls
Dry lake bed
Rock or coral reef
Piling or dolphin
Sunken wreck

Rock, bare or awash; dangerous to navigation

Marsh (swamp)
Wooded marsh
Woods or brushwood
Vineyard
Land subject to controlled inundation

Submerged marsh
Mangrove
Orchard
Scrub
Urban area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GREATER
EGYPT
REGIONAL
PLANNING &
DEVELOPMENT
COMMISSION

Figure 1 Base Map Grid System

Aerial Photography

In addition to the enlarged U.S.G.S. quadrangle maps, the Commission staff also utilizes matching aerial photographs. These aerials were taken during the Spring of 1973. The aerials are also on frosted mylar and cover the Region on the same grid pattern as the U.S.G.S. line maps (see Figure 3). The aerials are at the same scale of 1" = 800'. Each aerial has, at the bottom, a north arrow, scale, sheet number, location grid, and Commission logo (see Figure 3), and correspond to the grid system in Figure 1. When used in combination, the base map system provides an extremely useful tool (see Figure 4).

Advantages of the U.S.G.S. Base Maps

The Commission staff found the enlarged 7 1/2 minute U.S.G.S. maps to be most adequate for a land use survey of Regional scale, within the non-metropolitan areas. Experience thus far has proved the maps to be accurate and easy to read in the field. Especially helpful is the delineation of all roads in existence, as well as the delineation of all structures.

The Commission staff has not utilized the enlarged 15 minute U.S.G.S. maps in field surveys to date of this writing. These maps are much older; and, due to the greater enlargement necessary to reach the 1" = 800' scale,,they are less than perfect in line and detail. The Commission staff projects much more reliance on the aerial photographs in the areas covered by 15 minute maps.

Problems with the U.S.G.S. Maps

The major problem incurred with the U.S.G.S. maps and corresponding aerials was the lack of property and right-of-way lines. One solution to this problem is the utilization of the plat books and tax maps from the County Supervisor of Assessment offices. However, at this time, Jackson County is the only county able to reproduce these maps. The Jackson County maps vary from a scale of 1" = 600' in the rural areas to 1" = 100' in the more congested urban areas. The maps at the 1" = 100' scale proved especially useful within the corporate limits of the communities, as well as the congested areas along the state and federal highways. In most communities where tax maps are not available, base maps at 1" = 200' are available in the Commission office.

Additional Reference Materials

In addition to the U.S.G.S. base maps and matching aerials, the following sources are available in the Commission office for the cross check of information gathered from the field:

County Plat Books
County Tax Maps
Maps from the State of Illinois, Department of Transportation, Division of Highways, Bureau of Local Roads and Streets
Maps from the Department of Transportation, Division of Highways, Bureau of Planning in cooperation with the U.S. Department of Transportation, Federal Highway Administration
Railway Right-of-Way Maps
Utility Company Maps

Community plans are available for many communities within the Region, and these may also be checked.

The Land Use Classification System

The Land Use Classification System used by the Commission staff is based on an adaption of the one proposed in the Standard Land Use Coding Manual published as a joint effort of the U.S. Urban Renewal Administration and the Bureau of Public Roads, U.S. Department of Commerce, in 1965. The adaptation consists of a combination of categories designed to be most useful for general urban and regional planning within the Greater Egypt Region. There are nine basic categories in the Greater Egypt Local Coding System, and they are loosely based upon the HUD/BPR major categories. They are as follows:

1. Residential
2. Industrial-Manufacturing
3. Industrial-Non-Manufacturing
4. Transportation, Communication, Utilities
5. Trade
6. Services
7. Cultural Entertainment and Recreational
8. Resource Production and Extraction
9. Miscellaneous

Each land use activity can be coded into one of the major uses (1-9), and the further classified into a subcategory with the addition of one or more digit.

Certain extended classifications of specific land use activities will be indicated on the base land use map. However, the extended classification would not be used as a land use statistic. For example, a manufacturer of office furniture would be categorized as manufacturer-office furniture, or in our code, 20-2520. The second four-digit number is taken directly from the HUD/BPR manual. If a four-digit HUD/BPR number is unavailable, the SIC (Standard Industrial Classification) number is used with "S.I.C." after it.

The classification of land is designated in three ways: 1) number coding; 2) color coding; and 3) pattern coding. Each of the 48 two-digit codes in the Greater Egypt System corresponds to a specific color or combination of colors, or colors and symbols as a specific pattern.

If a particular land use contains more than one major category, criteria for deciding which code shall be 1) which activity generates most outside traffic, if all the same, then 2) which activity occupies the greatest number of square feet.

Survey Techniques and Procedures

General Procedures

The general procedure followed is:

1. A county is chosen
2. Township maps are prepared (put together)
3. A township or municipality (A) is selected
4. (A) is field surveyed
5. (A) is color coded
6. (A) is field checked
7. (A) is quantified
8. Upon completion of all municipal and township quantification procedures, municipal and township land use area totals are combined for county totals.

All Commission land use staff members are involved, on a rotating basis, with township map preparation, field survey, field data transcription, and area calculations.

Prefield Work

General Preparation

It is determined that, for the purposes of the field survey and initial recording of land uses, the Region be surveyed county by county. The municipalities of each county are surveyed first, then the rest of each county is surveyed township by township. It is realized that this method involves more staff time in preparation.

as the original base maps are developed from U.S.G.S. quadrangles, whose boundaries rarely correspond with township boundaries. The basis for the decision to take this extra time is that land use information by municipality as well as by township will prove a more useable tool, both to the Planning Commission and to the local governments who will be using the information to formulate land use policy.

The township field survey and transcription maps are put together by joining diazo prints of the U.S.G.S. base sheets to each other at the edges and then trimming them at township boundaries. They are done for only one county at a time. Also at this stage, copies of municipal base maps for all municipalities within that county are made and collected from Commission reproducible map inventory.

During the time period when the township maps are being put together for a county, other preparations for the field survey work are being completed. Local government and law enforcement officials are notified of the upcoming survey. Extra safety and identification equipment has been purchased for the survey car. This equipment includes a flashing yellow caution light with a magnetized base, which can be temporarily attached to the roof of the field survey car during the survey, and which is operated off the car's battery through the cigarette lighter. Also included are a bright orange car top sign saying CAUTION-SURVEY and magnetized identification signs for the side doors or trunk lid. Staff who are doing field work have identification. All full-time staff members are in possession of an official business card. This card, along with a valid driver's license, provides adequate identification.

The first township chosen to survey was selected for its appropriateness as a "pilot study". Murphysboro Township in Jackson County includes a zoned municipality besides numerous rural areas in both residential and manufacturing uses as well as agricultural uses. Township selection after the pilot study is based on the combination of the quality of the roads to be traveled as determined from county highway maps, and the weather.

After it is determined which township to begin surveying, the following list of equipment and materials is collected for use during the field survey:

Caution/Survey Sign; Flashing Yellow Light; Magnetic Identification Signs; Diazo Print of Township; Diazo Prints of Aerials; Assessment Maps for densely populated areas; 6-12 sharpened pencils (black); Oversized Clip Board (2' x 2' masonite with 2" bulldog clips); Plat Books; Greater Egypt manual for lists; HUD-BPR Standard Land Use Classification System; Staff identification.

Before leaving the office, the field team goes briefly over the township map and aerials to familiarize themselves with the general road setup and any obvious problems, or time consuming areas that may be encountered. At this point, the preparation for field survey is complete.

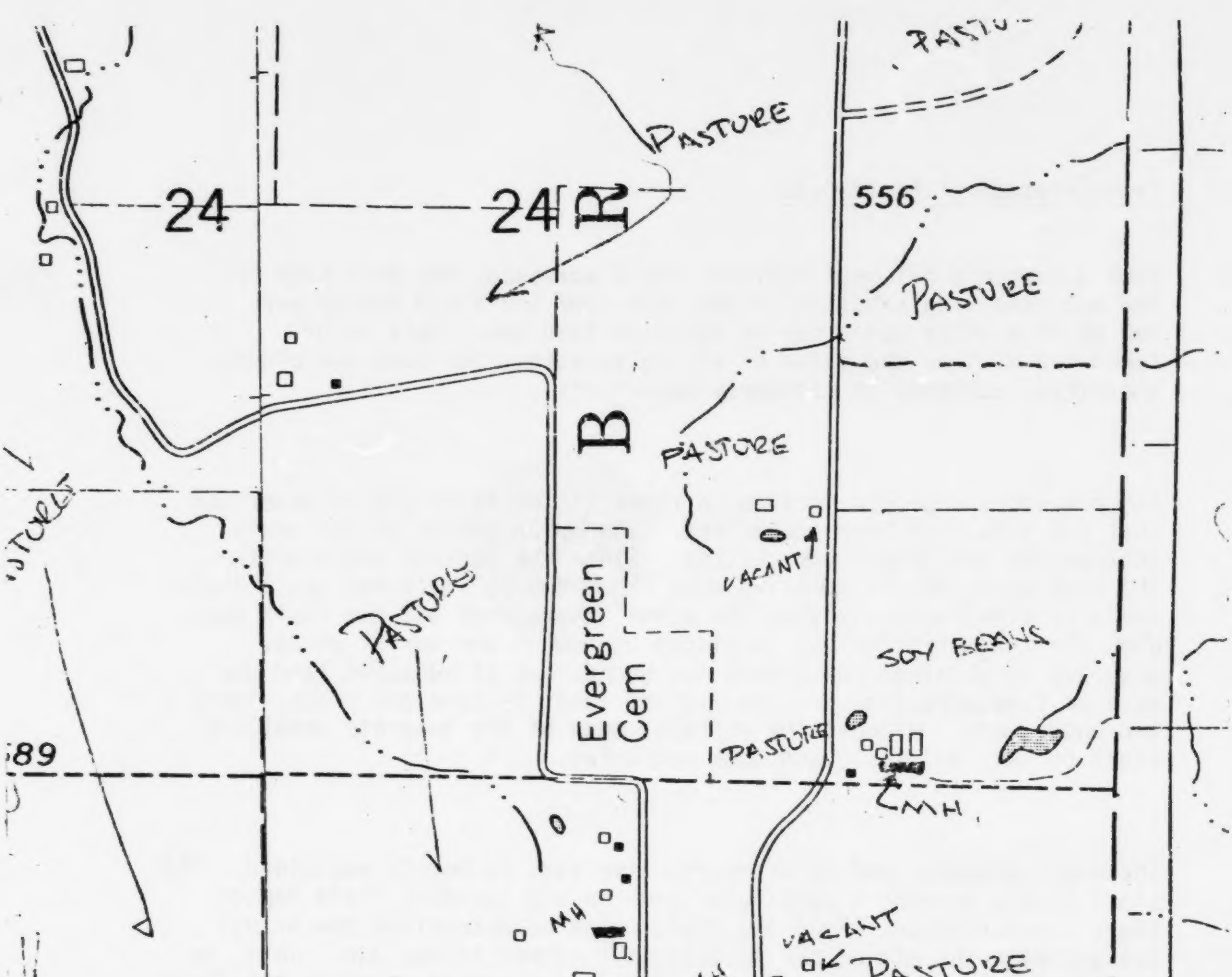
The Field Survey

Most of the actual field work is done using the "windshield survey" technique. One staff member makes observations of land uses while driving the survey vehicle through the area slowly enough so that the other member may also make, then note, both members' observations of land use on the field survey print of the township or municipality map. All Commission land use staff members are knowledgeable of the survey, transcription of information, coding, and quantification techniques used. All field note identifications are based on the projected accuracy needs of the staff member who will be coding and quantifying. Because of this, some coding may be done in the field; however, no structure or land cover is coded before it is verbally identified. The verbal identification needed for accuracy often requires only one or two words, since the field maps are already fairly accurate as to roads, fence and structure location.

The types of identifications vary as to particular land use. In some cases, particularly in less densely populated areas where they may not be easily observable either on the base map or aerial photograph, fence lines or other symbols, which may be helpful to the coder, are noted on the field maps. This is often done to help determine where one type of land use ends and another begins. Roads may be described as to the surface material. Agricultural land uses are generally identified by either crop name or use, as in "corn, beans, wheat, general agriculture, pasture", etc. Structural uses except agricultural outbuildings, farm residences, and single family detached residential dwellings, are identified by naming the use on the map. As in the examples given under the section on land use classification, an office furniture manufacturer might be identified as, "Parker and Sons - manufacturer, office furniture." If a code were assigned in the field, the note would also list "20-2520". Since the surveyor knows that the coder will be using the aerial photographs as an aid to the interpretation of the field map, and all forested areas show up readily on the aerials, he will rarely identify forested areas unless they are unusual in some way. For instance, some forested areas are used as pasture. When this occurs, a note such as "PAST. IN WOODS" is made on the field map, and the code would be 84. If a particular forested area is state or national property, the name of the area will be noted, such as "GIANT CITY STATE PARK" (the code for this use would be 74).

When questions as to actual land use arise, the Commission staff may stop and check the aerials. The aerial prints are particularly helpful in noting use of distant fields, reachable only by farm vehicle. If the information on the aerial is insufficient, then the staff may procede on foot to check out specific questionable uses. If the undertermined use is one of a structure, staff may make inquiries at the structure. If all the above checks fail to determine the actual use, special note is made on the field map to cross check the use in-house, prior to initial transcription. This cross check usually includes at least a check of plats and/or tax maps. See Appendix 3 for complete listing of the types of notes and abbreviations used on the field maps. All field maps are on file at the Commission offices. See Figure 5 for an example of a field survey map.

Standard practice has been to complete the survey within all municipalities of the county first, then to complete all of one township before beginning survey on another township. The only deviation from this practice has been when part of a township was passed over during the survey because it was thought more important to cover nearby areas having low type surface or earth roads before an expected period of heavy rain. The remainder of the township was then covered during the survey of a neighboring township. The field survey is considered to be complete for a township when the use of every section of land and structure is noted on the field map.


PASTURE
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Evergreen Cem
SOY BEANS
PASTURE
589
MH
MH
VACANT
PASTURE
MH
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2 MH
PASTURE
4
Farm Serv.
MH
MH
Ava
Sewag Pond
WJ
97
GAS STATION
25
Cen. Tele.
Library
Chiropractor
Car wash
25
*CBD-see municipal map
Bower

Figure 2 Field Survey Map - Data Recorded

Transcription of Field Data

When a township has been entirely field surveyed, the next step is the accurate transcription of the data from the field survey work map on to a color coded map of existing land use. This color coded map will be the basis of all calculations and land use plans; therefore, accuracy is extremely important.

The procedure employed includes a check of the field map to ascertain that all uses have been identified. The mylar prints of the aerial photographs are then cross checked. Since the aerials are exactly the same scale as the township maps (1" = 800'), staff may use a light table to simultaneously view the actual photograph and the field data. When the transcription map is placed on top of the aerial photo, accuracy is obtained concerning the boundaries of adjacent land use such as transportation systems, vacant land, pasture and crops, lakes and ponds, etc. Without the aerials, much of the accurate detailing would be very difficult and time consuming.

The exact process used to transcribe the data is herein explained. The staff person selects a particular area on the township field map to start transcription. From the field notes he determines the actual use and with the aid of the aerials, the extent of the use. Next, he mentally assigns number codes to all uses not number coded in the field. He then selects the appropriate Prismacolor pencil or pencils by checking the color codes assigned to the various number codes of the Greater Egypt Land Use Classification System. With the appropriate color he outlines the land being used for the particular activity in question. After he finishes color coding the first land use area, he accurately and methodically outlines every other land use within that particular township. When all field data has been accurately transcribed and color coded, the map is ready for the next step, quantification.

Quantification

One of the most important aspects of a land use study are the figures obtained concerning amounts and distribution of various types of land use. This is the quantification process. There are several quantification methods which vary in speed and accuracy. Two quantification techniques are utilized by the Commission land use staff; these are the polar planimeter and the nomograph. The polar planimeter is utilized by scribing the boundaries of the parcel being measured. It measures in square inches to the nearest hundreth. The nomograph makes use of a series of hyperbolic curves on a transparent material which, when placed over the parcel to be measured, indicates the area of the parcel directly into either square feet or acres depending upon the specific nomograph in use. The polar planimeter is used on parcels with irregular boundaries while the nomograph is used on more regular parcels (i.e., rectangles, triangles, etc.).

Planimeter Operation

After scribing the boundaries of the parcel being measured, a reading consisting of four numerals is obtained. This reading is the direct planimeter reading, or dpr.

When taking these readings, dprs. are noted according to land use being measured. An example may be "Residential-773", therefore the land use being measured is residential and the dpr. is 733. When all the areas of a township have been measured, the dprs. are added together for each land use on a sheet of analysis paper, and the totals recorded on a "Land Use Area Calculations" form (see Figure 3). This form utilizes a formula which reduces dprs. to acres.

This formula may be used for a map of any scale which is given as 1 inch = X number of feet. The formula is derived as follows:

Given: Scale 1" = 800'

Step 1: One square inch (1" x 1") on the map is equivalent to 640,000 square feet in the field (800' x 800'). In equation form, 1 square inch = 640,000 square feet.

Step 2: The next step is to reduce the square foot to acres. There are 43,560 square feet in one acre, therefore $\frac{640{,}000}{43{,}560}$ = Acres in field per 1 square inch on map, or 14.692378. Therefore, for a map with the scale of 1" = 800', a square inch on the map is equivalent to 14.692378 acres in the field.

LAND USE AREA CALCULATIONS

TOWNSHIP:__________________ COVERED BY SHEETS:____________

LAND USE	DIRECT PLANIMETER READING		FACTOR		ACRES		PERCENT	

SQUARE FOOT CONVERSION FACTORS

1" - 800' ---	14.692378
1" - 600' ---	8.2644628
1" - 100' ---	.2295684

NOTE: TO FIND CONVERSION FACTOR, FOR OTHER SCALES: (1" = n')

$$\frac{n^2}{43560} = \text{CONVERSION FACTOR}$$

Figure 3 Land Use Area Calculations Chart

The following formula may be used to determine factors for other scale maps:

Where X is the number of feet in the field equal to one inch on the map:

$$\frac{X^2}{43{,}560} = \text{acres per square inch}$$

The direct planimeter readings (dprs) are square inches and hundreths thereof; for example, a dpr of 324 is 3.24 square inches, 2 is 0.02 square inches, 3423 is 34.23 square inches, etc. (note that the last two digits are always hundreths). The following is an example of area calculations; the problem is to convert a dpr of 4369 into acres. The map scale is 1" = 600'.

Step One: determine acre in field per square inch on map.

$$\frac{(600^2)}{43{,}560} = 8.2644628$$

Step Two: convert dpr to acres, dpr is 4369 or 43.69 square inches, factor for map scale is 8.2644628. The equation is 43.69 x 8.2644628 = 361.07 acres

In some cases, particularly in small towns, an entire area may be single family residential (SRF) except for two or three lots. While it is realized that all lots are not the exact same size, for the purposes of this study, an average lot size is 60' x 120', or 7,200 square feet.

An example of this type of notation is: Given a total dpr of 2321, you wish to subtract the one or two small areas which are not SFR. The map scale is 1" = 800'.

Step 1: (23.21 x 640,000 square feet) - (3 x 7,200)

Step 2: 14,854,400 square feet - 21,600 square feet

Step 3: 14,832,800 square feet
to convert to acres, divide by 43,560
or $\frac{14{,}832{,}800}{43{,}560} = 340.51$ acres

The final calculations for a township are to determine percentage of various land uses by dividing each land use acreage by the total acreage of the township.

After this report was finalized, various changes were made in the calculation system due to time requirements. The land use tabulations of the last three counties to be surveyed--Jefferson, Perry, and Williamson--were done by a "cut and weigh" process utilizing an extremely sensitive, humidity and atmospherically controlled analytical balance owned by Southern Illinois University and utilized by Commission staff at one of the laboratories of the SIU Zoology Department.

The traditional approach to inventory land use is the windshield survey. This type of survey requires visual contact with each land use enabling verification of land use on base maps used with conventional low-altitude aerial photography for area determination. After all areas are visited and mapped, the acreages for individual land uses must be measured, followed by compilation of the data into tabular form. Overall, this process requires thousands of miles of driving, possession of up-to-date conventional aerial coverage, and many person hours of acreage measurements.

Under the time and financial constraints of the program, such an effort was not possible by the Southeastern Illinois Commission. Another method of land use inventory was needed. After careful evaluation of the requirements of the program, an alternative method was developed.

Through personal contacts with the staff of the EROS (Earth Resource Observation Systems) Application Assistance Facility, located in the NASA Base, Bay St. Louis, Mississippi, it was learned the U.S. Geological Survey had developed a system for land use inventory using remote sensing called LUDA (Land Use Data Analysis).

LUDA is being funded by an appropriation from the U.S. Congress which began in FY 1975. LUDA mapping comes from either direct appropriations from the Congress or 50-50 cost-sharing agreements with the States. Cooperative agreements can only be entered into where source materials are presently available.

Land use maps are compiled by the USGS utilizing topographic maps sheets, scale 1:125,000, as a base. High-altitude color infrared photos are manually interpreted and the land use information is compiled onto the base maps. The base maps can be enlarged to the desired scale with the positional accuracy being that of the compilation scale. The smallest size mapping units are 10 acres which are appropriate for land use and land cover data delineated at a scale of 1:125,000. The land uses are tabulated and digitized into a computer system for easy retrieval.

At this point in time, the State of Illinois has not entered into a cost-sharing agreement with USGS, but a portion of the state has been mapped. The Paducah Quadrangle land use inventory was available through the USGS and was acquired by the Southeastern Illinois Regional Planning and Development Commission.

The land use map was photographically enlarged to a ratio scale of 1:24,000. This process created 36 overlays of land use that could utilize USGS 7.5 minute quadrangle maps as a base. This type of arrangement provided the level of detail required by the 208 subcontract. However, two-thirds of the northernmost county was not included in the land use maps. Therefore a supplemental system was developed to augment the LUDA maps.

For the six 7.5 minute quadrangle in Hamilton County not covered by the LUDA maps, color infrared photograph ratio scale 1:63360, were obtained from EROS Data Center, Sioux Falls, South Dakota. Lan Land uses were manually transferred onto transparent mylar sheets at that scale. A number of ground truth tests were made to determine if the accuracy was as good as LUDA data. (The accuracy was found to be at least as good.) The resulting overlays of land use were photographically enlarged to a ratio scale of 1:24,000, thus supplementing the LUDA land use maps to completely cover the Region.

The classification system was uniform throughout the Region with the USGS Level II classification. Recent experiments with Levels I and II land use data referenced to 1:24,000, topographic maps have been conducted by researchers of the Maps and Surveys Branch of the Tennessee Valley Authority in conjunction with the Marshall Space Flight Center and Oak Ridge National Laboratories. Quite satisfactory results have been obtained when interpreting land use from high-altitude photography.

The next step in the inventory was acreage delineations. Time-consuming processes involved in the measurement of the number of acres for each individual land use were prohibitive. Another, faster method besides the polar planimeter or weighing land uses was used.

Arrangements were made with the NASA base, EROS Application Assistance Facility, for use of their digital planimeter. Land use maps for the Region were transported to Bay St. Louis where individual acreages were delineated. This procedure took five days and compiled 1,098,000 acres of land uses. The tabulation of individual land uses was accomplished in the office in a period of 10 days. The product of this effort included land uses tabulations for Facility Planning Areas, Townships, Counties, and the Region.

The combination of land use cover maps and acreage tabulations for regional as well as sub-regional areas provides baseline information for comparisons of the other data. In order to properly assess the impact of mining activity on the land in the ten-county areas today as well as in the past, mapping of the land use was essential. Furthermore, future developments and changes in mining activity as the energy demands of the nation continue to increase. The relationships between these data are essential to the development of a management plan mandated by Public Law 92-500 to clean up the area's water.

As a result of this effort, the Southeastern Illinois Regional Planning and Development Commission has complete detailed regional land use mapping dated 1975. This system was based on remote sensing techniques of land use mapping. Forty-two land use overlays, ratio scale 1:24,000, compatible with 7.5 minute U.S. Geological Survey mylar topographic sheets were produced. This mapping system was proven ideal for 208 Areawide Waste Water Management Planning and 701 Comprehensive Planning Assistance. Other projected users among government agencies for this system are the U.S. Forest Service, Soil and Water Conservation Service, and Shawnee Resource Conservation and Development to name three already expressing interest.

When the land use surveys for the two Regions were completed, the resultant tabulations were coordinated and combined. This data is presented in Table 1.

Past Trends

As the areas represented by the two cooperating Planning Commissions have developed somewhat differently in the past, and different data was available from which to identify trends, each area will be treated separately for this section of the report.

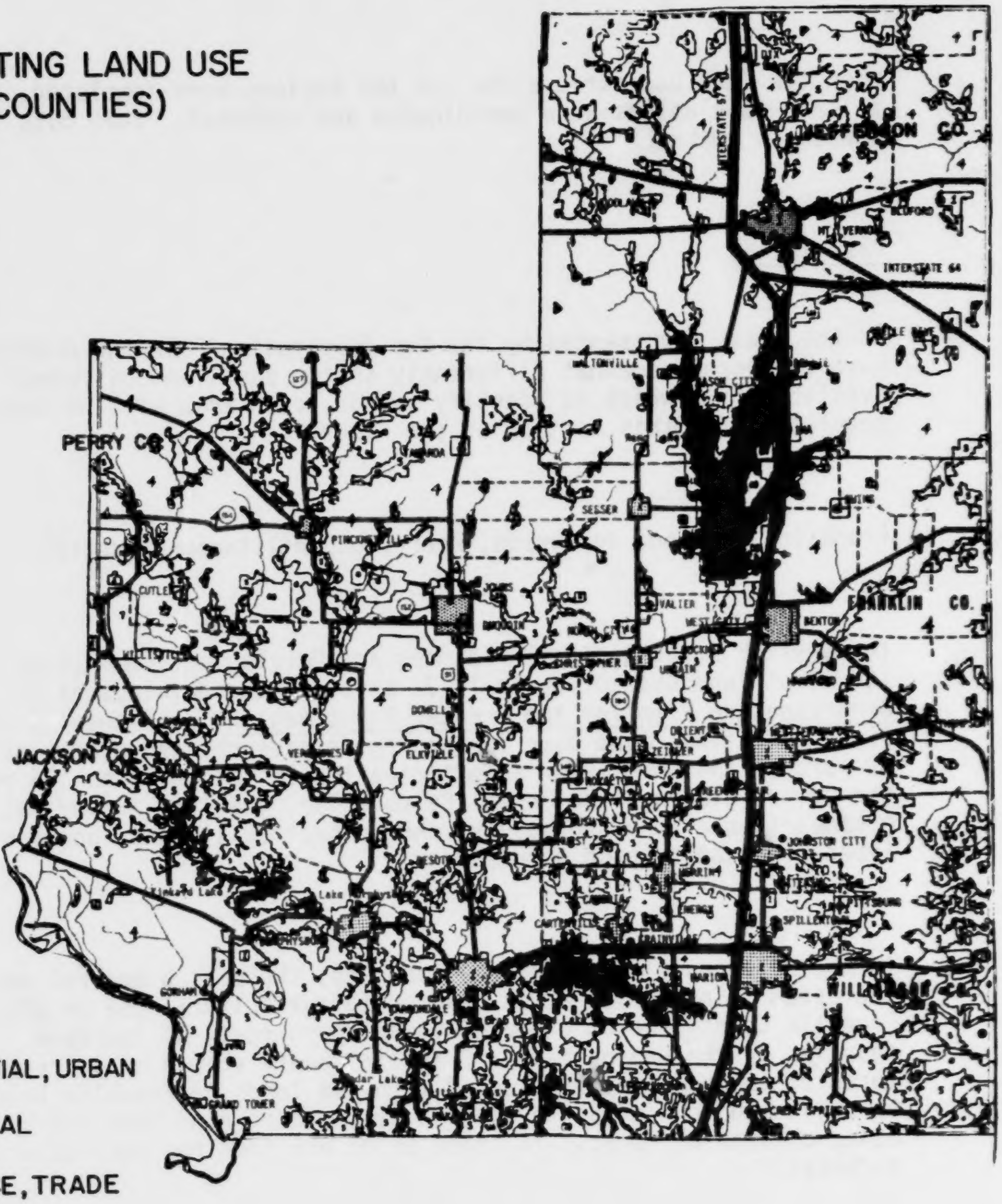
Franklin, Jackson, Jefferson, Perry, and Williamson Counties

The Greater Egypt Regional Planning and Development Commission completed its first land use survey in 1963, prior to the development of the Comprehensive Plan for the Greater Egypt Region, published in 1964. Since that time, land uses in the Region have changed dramatically, and as part of the Commission's participation in the Horizons '76 portion of the United States Bicentennial Celebration, the 1963 Survey was updated. A comparison of the two surveys shows specifically the location and types of changes which occurred.

In the category of agricultural land use, there is a general decrease indicated in number of acres devoted to agricultural use in all but Franklin County, which experienced an approximate 3% increase. All counties in the Region except Franklin County showed an increase in forested lands. The decrease of forested lands in Franklin County may be accounted for in part by the development of Rend Lake and by land being cleared of forests in order to be utilized for agricultural purposes.

The urban category increased in all counties, which may be explained not only by annexation, which has undoubtedly encircled many uses classified as industrial in 1963 (and which remain so, but within municipal boundaries), but also by the general population increase of the Region in the interim between 1963 and 1975. Much of the increase may be accounted for by scattered urban development in locations previously classed

EXISTING LAND USE
(10 COUNTIES)



JEFFERSON CO.
INTERSTATE 57
MT. VERNON
INTERSTATE 64
WALTONVILLE
PERRY CO.
PINCKNEYVILLE
SESSER
FRANKLIN CO.
BENTON
VALIER
CUTLER
JACKSON
DOWELL
ELKVILLE
CHRISTOPHER
JOHNSTON CITY
MARION
WILLIAMSON CO.
GORHAM
GRAND TOWER

1 RESIDENTIAL, URBAN

2 INDUSTRIAL

3 COMMERCE, TRADE

4 AGRICULTURE

5 WOODED

6 WATER

7 SURFACE MINE - ACTIVE

8 SURFACE MINE - INACTIVE

9 SURFACE EXPOSURE OF UNDERGROUND MINE - ACTIVE

10 SURFACE EXPOSURE OF UNDERGROUND MINE - INACTIVE

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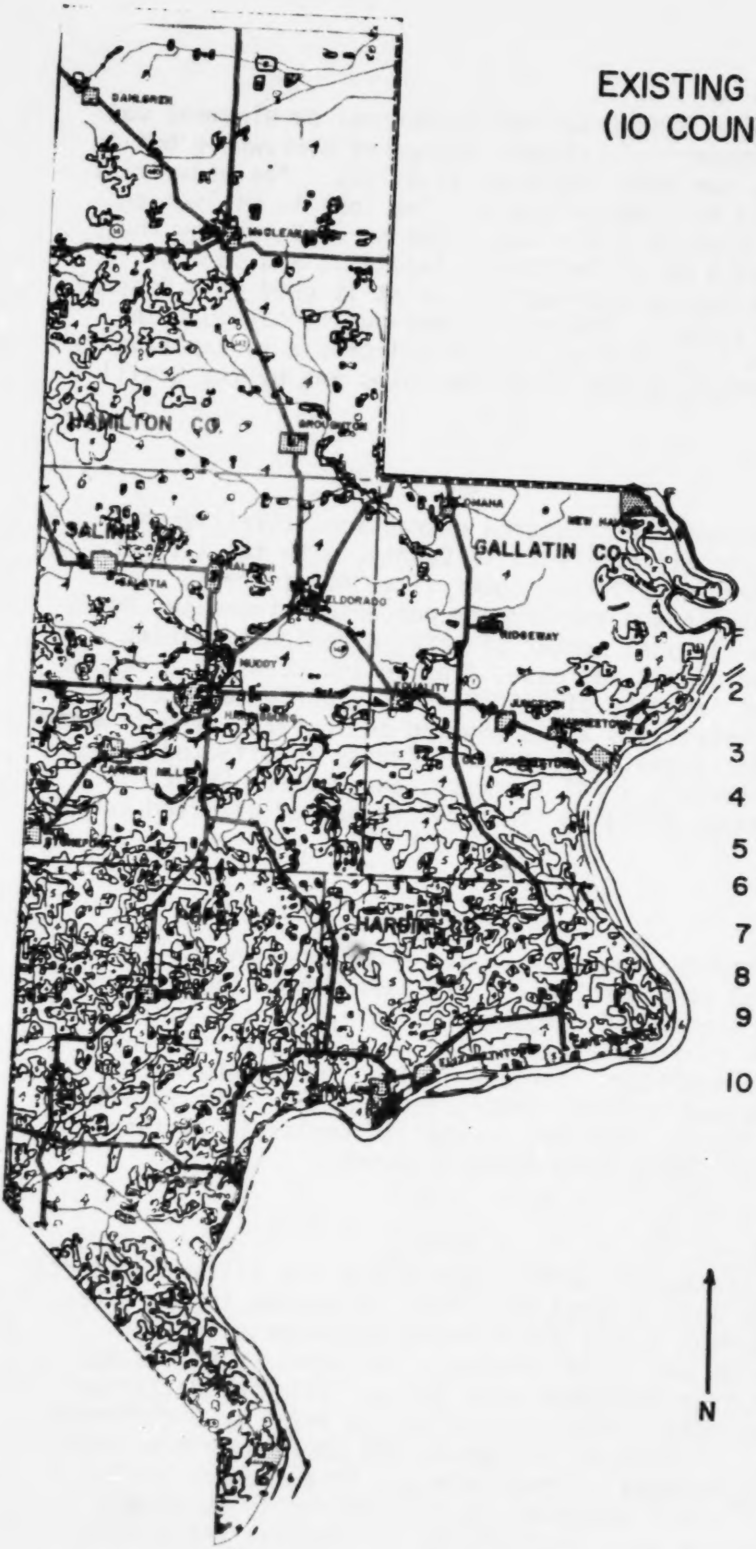
MARCH 1978
BY: P. CASSIDY, J. KENT

EXISTING LAND USE
(10 COUNTIES)


DAHLGREN
McLEANSBORO
HAMILTON CO.
BROUGHTON
OMAHA
SALINE CO.
GALLATIA
RALEIGH
ELDORADO
GALLATIN CO.
RIDGEWAY
MUDDY
EQUALITY
JUNCTION
SHAWNEETOWN
HARRISBURG
CARRIER MILLS
OLD SHAWNEETOWN
HARDIN
ELIZABETHTOWN

1 RESIDENTIAL, URBAN
2 INDUSTRIAL
3 COMMERCE, TRADE
4 AGRICULTURE
5 WOODED
6 WATER
7 SURFACE MINE - ACTIVE
8 SURFACE MINE - INACTIVE
9 SURFACE EXPOSURE OF UNDERGROUND MINE - ACTIVE
10 SURFACE EXPOSURE OF UNDERGROUND MINE - INACTIVE

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as agricultural, especially industrial and commercial development outside urban areas. The commercial category increased everywhere but in Williamson County, where the data indicates stability. The industrial uses increased in all but Williamson County. The loss in Williamson County, which amounted to about 2,800 acres, can be explained by the discontinuation of use of much of the Ordill facility, and some of it has been reclassified as public/semi-public, as it is used as a Federal Manpower skill training center. The public/semi-public category increased slightly for the total Region, and this increase is explainable by the public lands surrounding the three new lakes and by the Ordill skill center.

Land affected by mining and other resource extraction activities has significantly increased in all but Franklin County, with the largest percentage increase shown in Jefferson County: a 246% increase. Although Jefferson County showed the largest percentage increase, Perry County far surpassed it in total number of acres affected by mining. Perry County experienced a 147% increase, from 10,152 acres to a record high of 25,174 acres, an increase of 15,022 acres. Jefferson County went from 935 acres to only 3,238 acres showing an increase of only 2,303 acres. Williamson County follows Perry County in affected acres, with 21,972 acres representing a 74% increase, and Jackson County experienced a 24% increase, bringing its total number of affected acres to 7,089.

The scrub and swamp category generally showed a decrease which is accounted for by watershed management which may have turned some swampy areas into viable farm lands, and through urban use, (particularly residential,) of some lands previously classified as scrub. Every county except Perry showed a significant increase in land covered by water. This is obviously explained by Rend, Cedar, and Kinkaid Lakes in Jackson, Jefferson, and Franklin Counties; and by the reclassification of some areas in Williamson County from swamp to water.

Both highway and railroad totals were acquired from the Illinois Department of Transportation, both in 1963 and 1975. According to the data supplied, all but Jefferson County experienced an increase in land dedicated to public roads and rights-of-way. This discrepancy is partially due to the fact that different data is available for Jefferson County than that of the other counties, due to its being in a different state D.O.T. district. A decrease in highway ROW could have been expected in Jefferson County because of Rend Lake and because much of the right-of-way was within municipalities and classed simply as urban, as there was not sufficient data available to distinguish the highways from other uses in municipalities in Jefferson County.

The Region experienced a general decrease in lands being used for railroads and rail rights-of-way; however, the data for both Jackson and Perry Counties indicated an increase in lands used for rail. The overall decrease can be attributed to the Rail Reorganization Act of 1973, which preceded the abandonment of several sections of railroad, deemed by the Interstate Commerce Commission to be, on many counts, inefficient. The increase in rail use of lands in Jackson and Perry Counties can be attributed to the need for rail facilities caused by increased mining activities.

Gallatin, Hamilton, Hardin, Pope, and Saline Counties

The five counties comprising the Southeastern Region have not developed as quickly as those of the Greater Egypt Region; however, the development has apparently followed similar trends.

Most of the region's population live within the confines of city limits or at least the limits of townships within communities and/or surrounding township boundaries. Only 20% of the Region's population live in completely rural settings (generally assumed to mean more than 1-3 miles from a municipality). Rural land use was assumed not to change significantly except for further development of coal mining operations.

These types of operations were hard to predict in all but very general terms. Therefore, startling projections were not made about rural life within the Region. Rural life was expected, for the future, to be centered around agricultural and forestry activities, with development of coal mining operations playing an increasingly significant role.

The attributes Southern Illinois possesses that make balanced development possible, are considered by many people major disadvantages: rugged forest, covered land, an outdated and underdeveloped network of roads and a sparse population. At first glance, these factors may seem detrimental to potential development. However, the strength of this Region may be the lack of development. Advances in technology should make development less damaging to the environment. Increasing levels of government regulation, related to strip mining as well as to water pollution, provide a greater level of insurance against damage to the environment.

Quarries, active strip mines, abandoned strip mines, and partially reclaimed mines account for 13,616 acres, or about 1.23% of all lands within the five counties. National forest ownership accounts for 130,418 acres in our Region and represents 11.87% of all lands within the five counties. Together, these two activities account for 13.10% of all land use in the Region. To date, neither of these uses have presented physical barriers to growth for any community within the Region.

Chapter 4

PROJECTION OF LAND USES

Just as existing land uses are important in identifying and quantifying current water pollution problems, so are projected land uses an important component of the process to identify future water quality problems and their magnitude. When the use of a parcel of land changes, the pollution likely to result from that parcel of land also changes. Agricultural land which is converted to urban use will have a significantly different impact on water than would the conversion of that agricultural land to surface mining activity. In addition to total changes, it is also important to anticipate where and when those changes are likely to occur.

Methodology

Assumptions must be made in the development of any forecast. Land use projections should rely in part upon demographic and economic projections for the area. These two factors are particularly important for urban land use projections. At the Regional level, other factors also provide necessary insight. On a regional scale, natural resource identification and potential use play a heavier role in land use projections than they do at a municipal level. In developing forecasts of land use trends within the ten-county planning Region, the Water Quality Management Planning staff utilized not only municipal growth indicators such as population and economic growth trends, but also Regional indicators such as available mineable coal resources, available water resources, silvicultural and agricultural potential and public recreational open space.

Areas of anticipated urban development within the planning area were based primarily on assumed municipal population projections and economic trends developed by staff in and prior to 1976. Some of the population projections have subsequently been revised as necessary to maintain consistency with the State of Illinois, Bureau of the Budget population forecasts at the county and township levels. These projections and the methods for their development were initially published in the 208 Areawide Waste Treatment and Water Quality Management Planning Interim Report. Certain of the projections for 1995 have since been modified. Economic growth trends are assumed to be consistent with those identified in the Overall Economic Development Programs developed and adopted by the two cooperating Planning Commissions. Economic growth potential, primarily evidenced by industrial growth, in these programs was based upon several factors. Availability of, and accessibility to, adequate transportation systems is one factor. These transportation systems include, in Southern Illinois, highways, railroads, airports and air service, and river access. A second basis for projecting economic growth is available water supply. Also included are the existing economic base, the existing labor force, and educational facilities and opportunities. Economic growth in an area is also evidenced by an increase in commercial activity, particularly that of a Regional nature. Commercial growth based not only upon transportation facilities and population, but most emphatically on market. A major commercial center needs both a wide market range of population and a transportation system which can bring the market to the center. In addition, to be efficient and healthy, it must be outside the market range of similar competing centers.

Detailed geographic location projections for three types of urban growth (residential, commercial and industrial) expected to occur within identified wastewater treatment facility planning areas (FPA's) were prepared. The following criteria were used, whenever available, to identify where growth will or will not take place within the FPA's: 1) floodplain, 2) utility services available, 3) ease of development construction, 4) nearness to other like land areas, 5) transportation (rail for industry), 6) topography, 7) existing plans, 8) industry to be located northeast of municipalities if possible, due to the prevailing winds and 9) available land. Reference was made to all DHUD-701 comprehensive plans previously prepared for communities in the 208 area, and the land use plans, whenever practical and not outdated, were used as a guide to illustrate projections. Regional highway maps, regional maps of public water supply districts, regional comprehensive plans, aerial photos at 1" = 1 mile, and economic development programs were used, whenever practicable in the analysis process.

Assumptions made to project anticipated areas of mine-realted growth are explained in the Energy Report, Appendix C-1, of the 208 program. Essentially, mining activity is expected to occur only where coal reserves exist that are economically mineable with current technology.

Agricultural uses of land within the Region are assumed to follow national trends of increased production where possible. This, of course, is expected to occur on less acreage, as agricultural land is permanently permanently taken out of agricultural use for urban uses, and temporarily taken out for surface mining activities. It is anticipated that lands taken over by urban uses will not revert to agricultural uses. Due to recent mining reclamation laws, it is expected that land taken out of agricultural uses for surface mining will generally be reclaimed to agricultural uses within a 5- to 20-year period after mining.

One assumption underlying all land use change projections is that, on the Regional (as opposed to municipal) scale, maintenance of the status quo is assumed unless specific, realistic changes, based on known facts coupled with proven projection techniques, are in evidence. Specific facts which have been adopted as causing change in the status quo are location of mineable coal and areas of existing and projected municipal growth. Once change is projected within a general area, site specific land capabilities must account for the exact location of the change.

These capabilities include soil types, drainage, utility availability, transportation systems, etc.

Urban

For a regional land use projection, urban growth must be viewed in terms of the whole ten-county area. Within this area there are three municiypalities designated a major or primary growth centers. The three centers are Carbondale, Harrisburg, and Mt. Vernon. These cities were designated primary growth centers, because they exhibit the highest potential for not only residential growth, but also commercial and industrial growth. Both the Carbondale and Harrisburg centers are located within projected growth corridors which contain secondary growth centers expected to experience at least substantial residential and industrial growth. Finally, the growth corridors also contain tertiary growth areas expected to experience primarily residential growth due to their proximity to the primary and secondary growth centers. These growth centers and corridors are listed below.

Corridor	City	Type of Growth
Carbondale	Carbondale	Primary
	Marion	Secondary
	Murphysboro	Secondary
	Carterville	Tertiary
	Crainville	Tertiary
Harrisburg	Harrisburg	Primary
	Eldorado	Secondary
	Carrier Mills	Tertiary
	Muddy	Tertiary
Mt. Vernon	Mt. Vernon	Primary

In addition to those three areas identified as primary growth centers and the municipalities within their respective growth corridors, several other communities are expected to experience growth to a greater or lesser degree. While some commercial growth may be expected to accompany any significant residential growth, the nature of that commercial growth is generally of a convenience goods variety and therefore insignificant on a regional scale. Based on this concept, expected major areas are defined. Secondary growth areas are expected to experience significant industrial and/or residential growth, and tertiary growth areas are expected to experience primarily residential growth. Those areas expecting industrial growth are generally adjacent to a "growth generator" in the guise of improved transportation facilities and/or raw resources utilized in a particular manufacturing process. Illinois Interstate Highways 57 and 64, U.S. Route 460, and Illinois Route 13 are significant existing growth generators. Rend Lake, as a water resource for manufacturing and residential consumption, is an existing growth generator. Any industrial growth in one municipality is a potential residential growth generator in that and surrounding municipalities. Secondary growth areas (outside primary corridors) and their existing or potential growth generators are listed below:

Name	Type of Growth	Growth Generator
Benton	Residential, Industrial	I-57, Rend Lake
West Frankfort	Residential, Industrial	I-57
Johnston City	Residential	I-57, West Frankfort, and Marion
West City	Residential, Industrial	I-57, Rend Lake
Ina	Residential	I-57, Rend Lake College, Mt. Vernon and Benton

Herrin	Residential, Industrial	I-57, Carbondale corridor, Marion
Sesser	Residential, Industrial	Rend Lake
Pinckneyville	Residential, Industrial	Mining, potential FAP 411
DuQuoin	Residential, Industrial	Mining, potential FAP 411
McLeansboro	Residential, Industrial	U.S. 460
Ridgway	Residential, Industrial	Potential FAP 410, Shawnee Port District

The remaining municipalities expecting growth will be referred to as tertiary. These municipalities will probably experience primarily residential growth.

Name	Growth Generator
Ava	Kinkaid Lake, Coal
Bluford	Mt. Vernon
Bonnie	Rend Lake, Mt. Vernon
Broughton	Harrisburg corridor
Cambria	Carbondale corridor
Campbell Hill	Kinkaid Lake, Coal
Cave-In-Rock	
Christopher	I-57, Benton, West City, Rend Lake
Colp	Herrin
Cutler	Coal
Dahlgren	U.S. 460, Mt. Vernon, McLeansboro
DeSoto	Carbondale Corridor
Dix	I-57, Mt. Vernon
Eddyville	
Energy	Herrin, Marion
Equality	Harrisburg corridor, Shawneetown Port District
Galatia	Harrisburg corridor
Golconda	
Hanaford	I-57, Benton, West Frankfort
Hurst	Carbondale corridor, Herrin
Junction	Shawneetown Port Authority
Makanda	Carbondale corridor, Cedar Lake
Nason	Rend Lake
Old Shawneetown	Shawneetown Port Authority
Raleigh	Harrisburg corridor

Rosiclare	
St. Johns	DuQuoin
Shawneetown	Shawneetown Port Authority
Spillertown	I-57, Marion, Johnston City
Tamaroa	DuQuoin, Pinckneyville
Vergennes	Carbondale corridor, Potential FAP 411
Whiteash	I-57, Marion, Johnston City
Willisville	Coal
Woodlawn	I-64, Mt. Vernon

All other communities in the Region are expected either to stabilize at present populations, or to decline in population.

Mining

Urban growth is only one important aspect of land use which affects water quality. Within the 208 area, probably the most significant land use activity is coal mine related. The staff has identified, through exhaustive research, the mineable coal reserves within the area. It is one of the greatest economic resources of the Region, and coal mine-related land uses must be accepted as not only inevitable, but beneficial to the area. The benefits are obviously much greater today, now that the Illinois and Federal surface mine reclamation laws have been passed. These laws, when enforced, ensure that not only can the Region reap the benefits of mining this tremendous natural resource over the next 20-year period, but when the mining is done, and reclamation completed, the surface of the land will be usable for other activities of benefit to the Region. It must, of course, be remembered that both during and after mining, there are potential water quality problems that must be dealt with.

For the purposes of this land use report, the important question about mining is, "Where will it occur?" The location of the mineable reserves is shown in the Energy Report. The locations of announced, and unannounced but highly likely, projected new surface and underground mine sites, 1975-1995, is shown in the same report. Of the total 4267.7 square miles (2.731,328 acres) in the 208 area, about 175 square miles (112,000 acres) are expected to be affected by surface mining by 1995. (see Table 4). Data analyzed for the energy studies indicate that the land use within the Region most likely to be affected by mining is agricultural cropland. Woodland is the next most greatly affected, followed by non-crop agricultural land. The least affected current land use will be lands under water, although these lands are not completely immune.

Based upon urban growth location projections versus mineable coal reserve locations, the following list was generated to identify municipalities within the Region which may be faced with conflict caused by mining.

Municipal Areas Near Projected Coal Mining Areas

Ava - South of town
Cambria - N.W. of town, Sec. 29; south ½
Carbondale - S.E. of town, Secs. 21, 35, 36
E. of town, Secs, 24, 25
Crab Orchard - W. ½, Sec. 19
Crainville - E. ½, Sec 2; S. ½, Sec. 36; all but N.W. ¼, Sec. 35
DeSoto - North of town
DuQuoin - Along Rt. 152 W. of town; N. along Rt. 51
Elkville - 3 sides, between Dowell and Elkville
Equality - N. of Rt. 13
Gaskin City - W. ½, Sec. 23
Harrisburg - W. side, 1 mile N. and S. of Rt. 13
Herrin - W. side of town
Mitchellsville - N. of town, Sec. 10
Mt. Vernon - E. of Airport
Murphysboro - N.W. between town and Lake Murphysboro; S.E. of town, both sides of 127 and 13, ½ - 2 miles S. on 127, ½ - 1½ miles E. on 13
Pittsburg - S. ½ of town

Agriculture

As mentioned earlier in this report, the greatest proportion of land throughout the ten county 208 area is used for agricultural production. This is expected to remain true through the entire planning period. However, it is anticipated that there will be a decline in total acres in agricultural use. Agriculture represents an unusual case in that changes within this land use category are a function of the changes in other categories. As the urban land use category expands, the agriculture category declines. The same is true as mining and rural residential development expands. If additional land is purchases by state or federal agencies for public use (no major purchases are currettly anticipated), the majority of that land will probably come from property currently devoted to agriculture. The location and timing of these decreases in agricultural land are dependent upon the pattern of expansion within these other categories.

Table 3

ACREAGES TO BE AFFECTED BY SURFACE MINING 1976-1995 FOR AFFECTED 208 COUNTIES

Time	County	Wooded	Ag.	Ag., Other	Mining	Urban	Public	Water	Total
1976-95	Jackson	4296	10742	3341	4449	20	0	150	22998
	Jefferson	357	1768	207	338	0	0	0	2670
	Hamilton	0	3520	0	0	0	0	0	3520
	Perry	6042	27372	6148	1110	100	0	30	40802
	Saline	1565	12327	3000	755	240	0	20	17907
	Gallatin	840	3851	740	240	0	0	0	5671
	Williamson	5360	5690	3500	2920	460	220	40	18010
	Total	18460	61750	16936	9812	890	220	240	112388

This decrease in the number of acres in agricultural production will probably be accompanied by a continuation of the trend of more intensive farming of the remaining acreage. These more intensive techniques may include the use of additional fertilizers and pesticides, which may cause water pollution. Increases in the number and size of livestock confinement operations may result in increased water pollution from animal wastes.

Land use projections for the 20-year planning period have been developed for each of the 10 counties. The specific criteria used for making the urban and rural non-farm projections was primarily population related. It was developed by utilizing comparisons of past land use to person ratios within the area, trends of change for these ratios and population projections for the planning period. When the amount of acreage increase for urban and rural non-farm uses had been determined, an estimate of which current land uses would be affected was made. This information was combined with changes predicted due to mining projections and the results are presented in Tables 4 and 5.

Table 4
1975-1995 LAND USE CHANGE PREDICTION
CONDENSED CATEGORIES IN ACRES

	Urban	Rural Non-Farm	Agriculture	Forest	Water	Mine	Total
Franklin							
1975	9268	3917	189551	59259	12890	2365	277250
1995	9612	4019	189145	59219	12890	2365	277250
Gallatin							
1975	1208	604	167168	39947	4344	2041	215312
1995	1230	600	162559	39107	4344	7472	215312
Hamilton							
1975	1313	656	248010	37520	805	0	288304
1995	1451	651	244362	37515	805	3520	288304
Hardin							
1975	770	385	57238	48862	839	668	108762
1995	818	377	57198	48862	839	668	108762
Jackson							
1975	10157	7552	221651	127885	10031	7263	384539
1995	14739	8458	202478	123171	9881	25812	384539
Jefferson							
1975	6895	5770	267823	68341	9418	3286	361533
1995	7758	5626	265129	67984	9418	5618	361533
Perry							
1975	4650	2839	192600	57976	1005	25691	284761
1995	4630	3195	158736	51842	975	65383	284761
Pope							
1975	636	318	100567	137815	2073	22	241431
1995	703	307	100511	137815	2073	22	241431
Saline							
1975	3841	1921	185333	36648	5698	10885	244326
1995	3775	1892	169861	35083	5678	28037	244326
Williamson							
1975	11189	4302	144632	84290	12993	22608	280014
1995	11677	4630	134077	78799	12953	37878	280014
Region							
1975	49927	28264	1774574	698543	60096	74829	2686232
1995	56393	29755	1684056	679397	59856	176775	2686232

Source: Greater Egypt Regional Planning And Development Commission Staff

Table 5

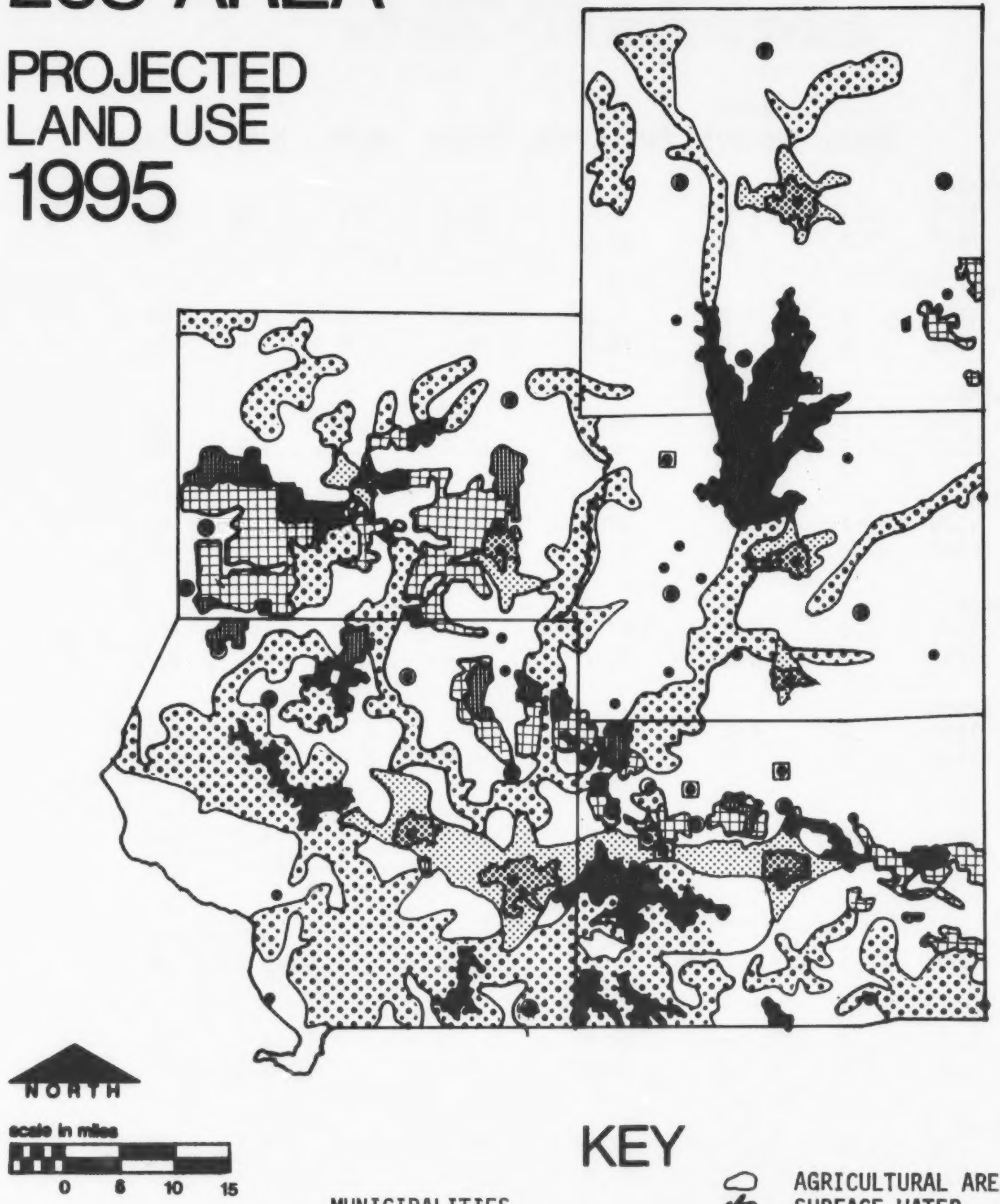
1975-1995 LAND USE CHANGE PREDICTION
CONDENSED CATEGORIES BY % OF COUNTY TOTAL

	Urban	Rural Non-Farm	Agriculture	Forest	Water	Mine	Total
Franklin							
1975	3.4	1.4	68.4	21.4	4.5	.9	100
1995	3.5	1.5	68.2	21.4	4.5	.9	100
Gallatin							
1975	.6	.3	77.6	18.5	2.0	1.0	100
1995	.6	.3	75.5	18.1	2.0	3.5	100
Hamilton							
1975	.5	.2	86.0	13.0	.3	0	100
1995	.5	.2	84.8	13.0	.3	1.2	100
Hardin							
1975	.7	.4	52.6	44.9	.8	.6	100
1995	.8	.4	52.5	44.9	.8	.6	100
Jackson							
1975	2.6	2.0	57.6	33.3	2.6	1.9	100
1995	3.8	2.2	52.7	32.0	2.6	6.7	100
Jefferson							
1975	1.9	1.6	74.1	18.9	2.6	.9	100
1995	2.2	1.5	73.3	18.8	2.6	1.6	100
Perry							
1975	1.6	1.0	67.6	20.4	.4	9.0	100
1995	1.6	1.1	55.8	18.2	.3	23.0	100
Pope							
1975	.2	.1	41.7	57.1	.9	0	100
1995	.3	.1	41.6	57.1	.9	0	100
Saline							
1975	1.6	.8	75.8	15.0	2.3	4.5	100
1995	1.5	.8	69.5	14.4	2.3	11.5	100
Williamson							
1975	4.0	1.5	51.7	30.1	4.6	8.1	100
1995	4.2	1.7	47.9	28.1	4.6	13.5	100
Region							
1975	1.9	1.0	66.1	26.0	2.2	2.8	100
1995	2.1	1.1	62.7	25.3	2.2	6.6	100

Source: Greater Egypt Regional Planning And Development Commission Staff

SOUTHERN ILLINOIS
208 AREA

PROJECTED LAND USE
1995



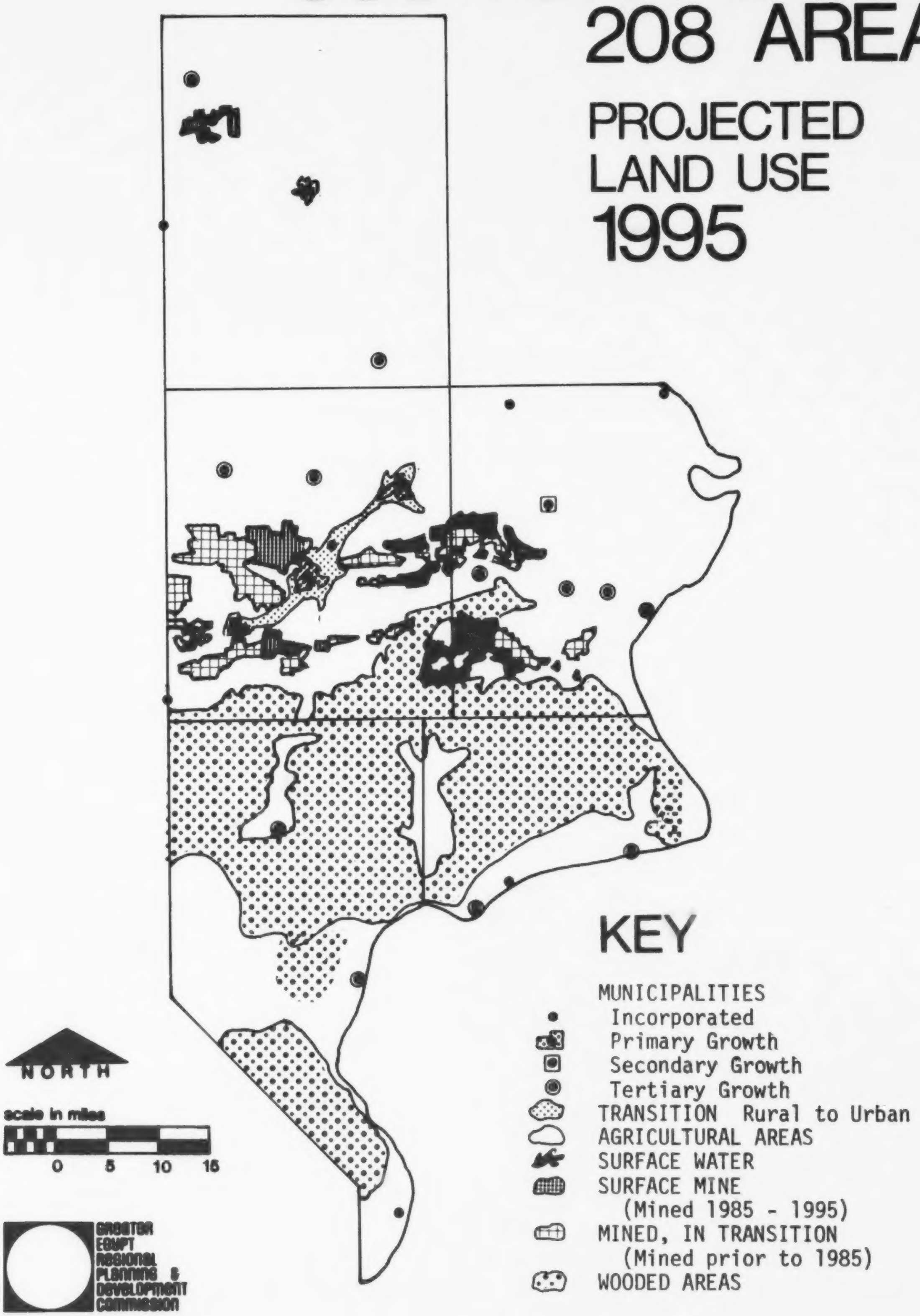
KEY

MUNICIPALITIES
- ● Incorporated
- ▦ Primary Growth
- ▣ Secondary Growth
- ◉ Tertiary Growth
- ░ TRANSITION Rural to Urban
- ○ AGRICULTURAL AREAS
- ■ SURFACE WATER
- ▦ SURFACE MINE (Mined 1985 - 1995)
- ▥ MINED, IN TRANSITION (Mined prior to 1985)
- ⁘ WOODED AREAS

GREATER EGYPT REGIONAL PLANNING & DEVELOPMENT COMMISSION

SOUTHERN ILLINOIS 208 AREA

PROJECTED LAND USE 1995


KEY
MUNICIPALITIES
Incorporated
Primary Growth
Secondary Growth
Tertiary Growth
TRANSITION Rural to Urban
AGRICULTURAL AREAS
SURFACE WATER
SURFACE MINE (Mined 1985 - 1995)
MINED, IN TRANSITION (Mined prior to 1985)
WOODED AREAS
NORTH
scale in miles
0
5
10
15

GREATER EGYPT REGIONAL PLANNING & DEVELOPMENT COMMISSION

Chapter 5

LAND USE REGULATIONS

There are numerous regulatory authorities available to local units of government which can have an effect on the use of land within the jurisdiction. This chapter describes four basic mechanisms available to counties, municipalities, and special units of local government in the efforts to control land use - Land Use Plans, Zoning Ordinances, Subdivision Regulation Ordinances, and Building Code Ordinances. In Illinois, Land Use Plans can be adopted by a local government as a guide to future development, it does not provide the assurance of implementation and enforcement that the other three mechanisms possess. Each of these mechanisms can be utilized to assist in the prevention of water pollution.

Land Use Plans

Land use plans may be prepared by a county or municipality in the State of Illinois which has, by ordinance, created a planning commission. Plans may be prepared with the technical assistance of a planning agency, a planning consultant, or the local government's own planning department. Land use plans are developed as a guide to the future development of the local goverment's jurisdiction. It is often developed as one element in a comprehensive plan for the unit of government. A HUD "701" comprehensive plan includes a land use plan.

Land use plans illustrate the location and size of each type of land use being considered and often show a 10, 15 or 20-year projection. A typical county land use plan in the 10-county 208 area would include about the same land use categories as those illustrated in chapters three and four. A municipal plan might include, at least, residential, commercial, industrial, recreational, and other public/quasi-public uses.

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A land use plan is important to water quality management because it shows where future areas of development are expected to occur, based on past and current trends in development, population growth, and other socio-economic factors. It also provides some insight into the land use classification in which the various undeveloped parcels of land are projected to fall. Thus, not only can anticipatory decisions be made about the location of new or expanded sewer systems, but projections can be made about the sizing of trunk sewer lines to future industrial and commercial areas.

It is important to understand that a land use plan is not a land use control. Land use controls enacted by municipalties and counties should be based upon the research, recommendations, and projections that are part of land use plans.

Comprehensive ordinances such as zoning, subdivision and building, are discussed in the following, however it should be kept in mind that not all ordinances that are land use controls need to be comprehensive ordinances. An ordinance may, for example, be drafted and enacted based upon health, general welfare, safety, soil conditions and land use projections that prohibits the use of sewage systems not capable of functioning, and only permitting the types of on-site private waste treatment systems that will function correctly under the conditions of the soils and land use projections. (it is not the recommendation of the Water Quality Management Plan to enact an ordinance of this type in lieu of comprehensive type ordinances, unless public opposition to zoning is overpowering and the absence of some regulation would pose a threat to health, safety, general welfare and water quality)

It is important that any land use control ordinance is complex, and may be challaged in court. It is therefore recommended that any ordinance enacted must have thorough legal review, and have the concerns of health, safety, morals and general welfare being the primary goals of the ordinance. The issues of water quality can be usually addressed in health, safety and general welfare.

In the following discussion of various land use controls it is impossible, due to the complexity of these controls, to provide full and complete explanations. Competent legal assistance should be sought where such controls are considered.

Zoning Ordinances

Zoning is another tool that can be used by local governments to control the pattern of development. By controlling land use development patterns, zoning can provide forecasts about the type, amount, and location of development relating directly to specific land use categories. As a result of an analysis of such land use forecasts, the local governing body can determine which areas need to be served by water supply and sanitary sewer systems.

A zoning ordinance prepared for county or municipal adoption consists of two major parts: 1) the zoning ordinance itself, which describes in detail the controls to be applied to each zone (each land use category); and 2) the zoning district map, which illustrates graphically the location and boundaries of each zoning district (each land use category). Thus each type of land use shown on a zoning district map is keyed to like zoning districts described in narrative form in the ordinance.

There are procedures for enacting zoning ordinances which must be followed. These procedures are very exact and very extensive, therefore the following is an overview and should not be considered to be "all that is necessary to enact zoning".

1. A land use plan should be prepared as discussed in the previous section Land Use Plans.

2. The municipality or county must apoint a zoning commission charged with drafting the ordinance and the official map.

3. The zoning commission must adopt the zoning ordinance and map.

4. The zoning commission must hold public hearings to gain public comment.

5. The zoning ordinance and map is presented and adopted by the municipality or county.

There are several differences between a land use plan and a zoning ordinance and map.

1) A land use plan is a long range plan, while a zoning ordinance is usually a compromise between existing land use patterns and the long range patterns shown in the plan.

2) By being a compromise, the zoning district map may show existing areas of industrial, commercial, or public uses which may exist and be relatively incompatible with adjacent uses, but may be "phased out" in the long-range land use plan.

3) The land use plan is intended to be a good guide to follow for future development. A zoning ordinance can be implemented and enforced to control land use, e.g., to prohibit certain uses of land in zoning districts which call for such prohibition. Existing nonconforming uses, however, usually may continue as "nonconforming uses," as long as continuous operations occur (for example: industry in a commercial or public use district; or gas stations in a residential area).

In the 208 area, the adoption of zoning ordinances can prohibit undesireable uses from developing in areas where they are not wanted. A zoning ordinance can be a legal tool for the counties and municipalities in the area to use, because it can be implemented and enforced. Prime agricultural lands may be spared from surface mining, and residential development which is sprawling in nature can be better contained and more readily and economically served with water supply and sanitary sewers.

Among the land use controls found in zoning ordinances providing the constitutional ends of promoting health, safety, (morals) and general welfare (are maximum) density limits, preventing the overcrowding of land. This ensures adequate light and air, and also results in preventing the overcrowding of private (rural) sewage systems, there by greatly reducing the potential number of private sewage systems per grass acre.

Illinois enabling legislation provides that municipalties may exercise its zoning jurisdiction up to 1½ miles outside the corporate limits (extra-territorial) providing that this area has not been previously zoned by another municipality or by the county (if the county enacts a zoning ordinance all municipalities' jurisdiction within the county, outside the corporate limits becomes preempted). Extra-territorial jurisdiction offers assurances that the adjoining land use outside corporate limits will be compatable with the land use of the municipality.

A municipality that exercies the extra-territorial jurisdiction can ensure that problems in the surrounding area jepordizing water quality resulting from overcrowding through the lack of county adopted land use controls can be limited.

Zoning, along with Subdivision Regulations, is probably the most functional direct method of land use regulation which can have a considerable impact of water quality control.

Subdivision Regulations

In the State of Illinois, Subdivision Regulations can be adopted by local general purpose governments. Two of the ten counties in the 208 area, as well as several of the area's municipalities have adopted Subdivision Regulations. However, most of the local governments have not, to date, adopted and implemented such regulations.

Subdivision regulations, as the title implies, are regulations developed to manage the use of land: street patterns, widths, and surfaces; building "setbacks" from front and side streets; ratio of structure area to lot area; utility supply lines, and electrical distribution systems; sidewalks, curbs, and gutters; storm sewers; street furniture; and sometimes other elements which should be considered in developing a subdivision. Subdivision development, through the process of ordinance adoption and implementation at the local level, can control and upgrade the use of land in developing areas. It can be applied by counties in instances of cluster development in unincorporated areas, proposed new subdivisions in rural areas, and rural planned unit developments. Municipalities often apply subdivision regulations to new subdivisions within the incorporated boundary as well as to adjacent areas and developing areas within the extra-territorial 1½-mile limit (provided to municipalities which have adopted zoning). In fact, the adopted Subdivision Regulations are applicable to all land within the jurisdiction of the local government.

A subdivision ordinance can be developed and adopted by a county or municipality in the same manner that a land use plan is adopted.

> "A new subdivision of land is not an isolated experience involving only the buyer and seller. The pattern of a subdivision becomes the pattern of a community, which in turn may influence the character of an entire city. If growth is to be orderly and rational, some control over land development must be exercised. In the early part of this century, the line of urbanization moved westward, and land speculation began to distort the growth of communities. Uncontrolled subdivision of land left many communities without adequate streets, water mains; or sewers. Nearby governmental units often extended their facilities to many more people than the facilities were designed to service. The result was "urban sprawl;" disorderly, chaotic growth, followed by depressed economic values..."
>
> "Today, subdivision regulations are a tool to fashion development in defined ways and by prescribed methods, regulating the use of private land in the public interest..."[1]

Subdivision Regulations also provide what is known as police power:

> "The power to regulate private property to promote the general health, safety, and welfare of the community is known to the law as the "police power." As an inherent attribute of sovereignty, this power may within its constitutional limits be exercised without payment or compensation to the owner of property affected, despite substantial economic deprivation..."
>
> "Subdivision regulation has long been acknowledged to constitute an important aspect of the exercise of police power. The relationship of subdivision regulation to health, safety, and general welfare, through requirements for adequate sewerage, drainage, streets, parks, and recreation, is well established..."
>
> "Within recent years the exercise of subdivision regulation has become increasingly broadened by incursions into the areas of timing of development, wetlands, and floodplain protection, reservation of land and mandatory dedications, and protection against environmental degradation, so that the outer limits of the police power are being reached. At this juncture the constitutional restrictions of due process (prohibiting taking of property for public use without just compensation) come into play..."[2]

The purposes of subdivision regulations are not only to provide orderly growth and development in general. They are also intended to serve a number of other purposes, some of which are directly related to the purposes of the 208 program and water quality management. These regulations should be adopted by municipalities (as well as counties) for the following purposes:

1) To protect and provide for the public health, safety, and general welfare of the municipality [or county]...

2) To guide the future growth and development of the municipality [or county], in accordance with the Master Plan...

3) To provide for adequate light, air, and privacy, to secure safety from fire, flood, and other danger, and to prevent overcrowding of the land and undue congestion of population...

4) To protect the character and the social and economic stability of all parts of the municipality [or county] and to encourage the orderly and beneficial development of all parts of the municipality [or county]...

5) To protect and conserve the value of land throughout the municipality and the value of buildings and improvements upon the land, and to minimize the conflicts among the uses of land and buildings...

6) To guide public and private policy and action in order to provide adequate and efficient transportation, water, sewerage, schools, parks, playgrounds, recreation , and other public requirements and facilities ...

7) To provide the most beneficial relationship between the uses of land and buildings and the circulation of traffic throughout the municipality, having particular regard to the avoidance of congestion in the streets and highways, and the pedestrian traffic movements appropriate to the various uses of land and buildings, and to provide for the proper location and width of streets and building lines...

8) To establish reasonable standards of design and procedures for subdivisions and resubdivisions, in order to further the orderly layout and use of land; and to insure proper legal descriptions and monumenting of subdivided land...

9) To insure that public facilities are available and will have a sufficient capacity to serve the proposed subdivision...

10) To prevent the pollution of air, streams, and ponds; to assure the adequacy of drainage facilities; to safeguard the water table; and to encourage the wise use and management of natural resources through the municipality [or county] in order to preserve the integrity, stability, and beauty of the community and the value of the land...

> 11) To preserve the natural beauty and topography of the municipality and to insure appropriate development with regard to these natural features...
>
> 12) To provide for open spaces through the most efficient design and layout of the land, including the use of average density in providing for minimum width and area of lots, while preserving the density of land as established in the zoning ordinance of the municipality [or county]...[3]

Building Codes

There are many kinds of building codes, some of which have a direct relationship to the 208 program and water quality management. Some codes, depending upon their purpose and function, can also affect the land use pattern. A building code, as in the cases of zoning and subdivision regulations discussed earlier, is a legal tool to be used to control building construction and/or performance.

> "A building code is a legal document which sets forth requirements to protect the public health, safety, and general welfare as they relate to the construction and occupancy of buildings and structures. This is accomplished by establishing the minimum acceptable conditions for matters found to be in need of regulation. Topics generally covered are exits, fire protection, structural design, sanitary facilities, light and ventilation, etc....."[4]

Building codes regulate more than building construction.

> "The typical building code regulates the construction, alteration, maintenance, repair, and demolition of buildings and structures. It may or may not regulate the installation and maintenance of mechanical systems and equipment within or appurtenant to buildings and structures. Many experts look upon the entire complex of regulatory codes, including electrical, plumbing, heating, boilers, pressure vessels, air pollution, air conditioning, refrigeration, elevators, and flammable liquids as integral parts of the comprehensive building code..."[5]

> "Housing codes are basically maintenance codes which also regulate the environmental factors of residential buildings and, in the case of rental property, the facilities that must be supplied by the landlord. Housing codes are frequently a chapter in the building codes of major cities, but there is a trend today to separate the housing code from the building code..."[6]

There are two general types of building codes. These are usually classified as being specification codes or performance codes.

> "The specification code describes in detail exactly what materials are to be used, the size and spacing of units, and the methods of assembly..."
>
> "The performance code, on the other hand, prescribes the objective to be accomplished and allows broad leeway to the designers in selecting the materials and methods that will achieve the required results..."
>
> "As a practical matter, a pure performance code would be impossible to enforce because the only proof of inadequate design or poor construction would be the failure of the building. What is important about a performance code is that where specifications are used, provisions are made for the substitution of alternate systems and materials that can be proved adequate by tests of engineering calculations..."
>
> "All four model building codes used in the United States today are considered by the publishing organizations to be performance codes. Actually, they are all a judicious combination of standard specifications and performance requirements. Although these codes establish performance requirement that the designers must accomplish, the quality of the materials selected and the manner in which they are used is governed by material standards and accepted engineering design criteria, which are specification documents. The proof of performance of the methods and materials selected by the designer is governed by national recognized and accepted test standards..."[7]

Environmental requirements may be found in the housing code or the building codes.

> "A code enforcement agency cannot justify issuing a building permit that would allow construction of a building that would be in violation of the housing code..."
>
> "Requirements covering natural and artificial light and ventilation, room sizes, ceiling heights and sanitary facilities are generally found in building codes..."[8]

In areawide 208 planning, the adoption of building codes in a uniform manner can influence development patterns, growth, industrial development, economy, sanitary sewer system requirements, and water quality management.

One major link between building codes and land use is the following: where building code ordinances are adopted and implemented, the citizens are guaranteed that they will not have the potential problem of later having sub-standard structures located adjacent to them. Another major link is the fact that, where building codes are in effect, there is less chance for deterioration of a few structures occuring which would have a negative effect on adjacent property values. Contiguous residential, commercial or industrial development is also encouraged through the building code process; and where zoning also exists, the building inspector is usually an important factor in zoning enforcement.

The major link between building codes and 208 water quality management is the Plumbing Code. Without a plumbing code, human excretion could be channeled to the municipality's sanitary sewer system, and all other wastewater from lavatories, kitchen sinks, restaurants, hospital facilities, etc., could be separately piped to another outlet or headwall which drains directly, without treatment, into a ditch or stream. Thus, a properly enforced Plumbing Code can assure that all wastewater generated by various means within a building will reach the sanitary sewer system of the municipality or sanitary district.

Adoption of a Plumbing Code is a crucial measure to be undertaken in the process of improving stream and lake water quality in the 208 area.

The nationally recognized model building codes and plumbing codes and their publishers are listed below:

Building Codes	Source
Basic Building Code	Building officials and code Administrators (BOCA)
National Building Code	American Institute of Architects (AIA)
Southern Standard Building Code	Southern Building Code Conference (SBCC)
Uniform Building Code	International Conference of Building Officials (ICBO)

Plumbing Codes	Source
Basic Plumbing Code	Building Officials and Code Administrators (BOCA)
National Plumbing Code	American Society of Mechanical Engineers (ASME)
Southern Standard Plumbing Code	Southern Building Code Conference (SBCC)
Uniform Plumbing Code	International Association of Plumbing And Mechanical Officials (IAPMO)

Existing Land Use and Related Controls in the 208 Area

In the fall of 1976, research was conducted throughout the 208 area to determine the existing situation relative to local government ordinance adoption for land use and related controls. The chief purpose of this research was to assess each local governmental unit, particularly the general purpose units, in regard to their interest and effectiveness in dealing with water quality problems through the processes of land use regulations and/or sanitary sewage system development.

The result of these research activities produced three tables which provide a quick analysis of the local situation regarding existing land uses and related control measures. Table 6 illustrates the legal or administrative authority which particular local governments have in order to satisfy the management agency requirement delineated in P. O. 92-500. Table 7 provides information about minicipalities, i.e., which ones have or do not have sanitary sewage systems. Table 8 illustrates the situation, among local units of government in the 208 area, regarding the adoption of local codes and ordinances (including land use controls). In this table, the most important land use control findings are as follows:

1) No counties of the ten who were contacted have zoning ordinances;

2) 25 municipalities, of 78 contacted, do have zoning ordinances;

3) 4 counties, of 10 contacted, have subdivision regulations;

4) 20 municipalities, of 78 contacted, have subdivision regulations;

5) 2 counties, of 10 contacted, have building code ordinances;

6) 31 municipalities, of 81 contacted, have building code ordinances.

(For more detail refer to Appendix A.)

Table 6
P.L. 92-500, SECTION 208 QUESTIONS

Potential Management Agencies	Directly or By Contract to Design & Construct, Operate, & Maintain Sewer Systems	Assure Each Participant Pays Its Share of Sewage Treatment Costs	Accept Industrial Wastes for Treatment	Refuse to Receive Wastes for Any Municipality or Subdivision	Incur Short & Long Term Indebtedness
County - (County Health)	X	X	X	X	X
Townsnip	X		X	X	X
Municipality	X	X	X	X	X
River Conservancy District	X	X	X	X	X
Sanitary District	X	X	X	X	X
Water Authority		X			X
Public Water District	X				X
Drainage District					X
Surface Water Protection District	X				X

Table 7
FACILITY PLANNING AREAS IN 208 AREA

1. Ava
2. Belle Prairie City*
3. Belle Rive*
4. Benton, West City*
5. Bluford
6. Broughton*
7. Campbell Hill
8. Carbondale
9. Carrier Mills
10. Carterville, Cambria, Crainville
11. Cave-In-Rock^{x}
12. Christopher, North City* Urbain,* Valier
13. Colp
14. Creal Springs
15. Cutler
16. Dahlgren^{x}
17. DeSoto
18. Dix
19. DuQuoin, St. Johns*
20. Eddyville*
21. Eldorado
22. Elizabethtown
23. Elkville, Dowell*
24. Equality*
25. Freeman Spur*
26. Galatia
27. Golconda
28. Gorham
29. Grand Tower
30. Hamletsburg*
31. Hanaford*
32. Harrisburg, Muddy
33. Herrin, Energy
34. Hurst, Bush*
35. Johnston City, Whiteash*
36. Junction*
37. Lake of Egypt*^{1}
38. Macedonia*
39. Makanda*
40. Marion
41. McLeansboro
42. Mt. Vernon
43. Murphysboro
44. New Haven*
45. Omaha*
46. Pinckneyville
47. Pittsburg*
48. Raleigh*
49. Rend Lake-East,* Ewing,* Ina,^{x} Bonnie^{x}
50. Rend Lake-North,* Nason*
51. Ridgway
52. Rosiclare
53. Royalton
54. Sesser
55. Shawneetown, Old Shawneetown*
56. Stonefort*
57. Tamaroa
58. Thompsonville
59. Vergennes*
60. Waltonville*
61. West Frankfort, Orient*
62. West Rend Lake*^{1}
63. Willisville
64. Woodlawn
65. Zeigler

NOTE: First Community-is FPA lead community.

Legend

* Community in FPA without sewage system.
*^{1} No municipality exist in FPA.
x Sewage system under construction.

Table 8
QUESTIONNAIRE RESULTS ON LOCAL CODES/ORDINANCES IN THE 208 AREA CONCERNING WATER QUALITY

	Counties	Munici-palities	River Conservancy Districts	Sanitary Districts	Public Water Districts	Drainage Districts	Soil & Water Conservation Districts	Total	Total Number of Governmental Units in Ten-County 208 Area
Number Govt. Units Contacted	10	78	5	2	30	22	9	156	159
Codes in Force:									
-Sewer Ordinance	2	45	No	No	1	No	No	48	
-Zoning Ordinance	No	26	No	No	1	No	No	27	
-Subdivision Regulations	4	20	No	No	1	No	No	25	
-Floodplain Zoning	3	23	No	No	No	No	No	26	
-Building Code Ordinance	3	31	No	No	No	No	No	34	
Ordinances Being Considered	3	28	1	0	1	0	2	35	

Table 8
(Continued)

	Counties	Munici-palities	River Conservancy Districts	Sanitary Districts	Public Water Districts	Drainage Districts	Soil & Water Conservation Districts	Total	Total Number of Governmental Units in Ten-County 208 Area
Target Date For Adoption	0	1	0	0	0	0	0	1	
Tap on Charge Sewer System	0	46	1	1	1	0	0	49	
Legal Action Against Pollution of Water	1	2	0	0	0	0	0	3	
No. of Times Last 3 Years	3	NR	NA	NA	NA	NA	NA	3	
Request IEPA For Legal Action	1	3	0	0	1	0	No	5	
Existing Ordinances Available	7	45	NA	NA	1	NA	NA	53	

Note: NA means Not Applicable
NR means No Response

FOOTNOTES FOR CHAPTER 5

[1] Robert H. Freilich and Peter S. Levi, Model Subdivision Regulations, Text and Commentary, A.S.P. O.), 1975, p. 1.

[2] Ibid., pp. 9-10

[3] Ibid., pp. 17-18

[4] Richard L. Sanderson, Codes and Code Aministration, Building Officials Conference of America, Chicago, 1969, p. 13.

[5] Ibid. p. 14.

[6] Ibid.

[7] Ibid., p. 15.

[8] Ibid., p. 19.

Chapter 6

OTHER LAND USE CONTROL MECHANISMS

A large number of varied programs exist at the federal, state and local levels which can influence land use. Many of these programs provide a legal or financial basis for changing the usage of parcels of land. Other programs provide mechanisms to make improvements to property which would not change the use of the land. All of these programs can have an effect on land use and ultimately on water quality.

The programs listed in this chapter should not be considered land use or water quality programs. In most of the cases presented the control of land use and the improvement of water quality are ancillary to the main thrust of the program. Actions taken under some of the programs in the past may have been detrimental to water quality. It should be emphasized that these are programs which may be used to improve water quality, they are not necessarily programs which have been, are being, or will be used to improve water quality.

Actions taken under these programs are usually the decision of the federal or state agency receiving the funding under the program. Their perception of the water quality problems and remedies in the ten county 208 area may be significantly different than those perceived at the local level. And while some programs have sponsored numerous projects in the 208 area, other programs have had no involvement within the 208 area.

The following chapter has been divided into two sections. The first section lists specific authorities that federal, state, and local agencies possess which could affect land use in either a direct or indirect manner. The second section describes several relatively indirect land use control techniques which may be used primarily by local governments.

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Specific Authorities Affecting Land Use

Federal Agencies and Programs

Several federal agencies and programs can have a direct or indirect affect on land use which subsequently could affect water quality. It should be noted that some federal programs may be designed for a particular purpose which does not appear to have an effect on land use or water quality, but in fact can have an indirect effect.

The following federal agencies are those which have programs which can affect land use and/or water quality:

- U.S. Environmental Protection Agency
- U.S. Department of Interior
- U.S. Department of Agriculture
- U.S. Department of Transportation
- U.S. Internal Revenue Service
- U.S. Corps of Engineers
- U.S. Department of Housing and Urban Development
- U.S. Department of Commerce
- U.S. Small Business Administration

In the following two tables, the federal laws relating to water quality and the federal laws that might be used to reduce water pollution from either nonpoint or point sources are provided.

Federal agencies which have programs operating in the 208 area of Southern Illinois, with their general purpose as related to land use and water quality, are given below.

U.S. Forest Service, Department of Interior: This agency maintains its main offices within the 208 area at Harrisburg. The U.S. Forest Service has the responsibility of managing the Shawnee National Forest, part of which covers a large portion of the southern part of the 208 area. It operates various camping sites and recreation facilities in addition to its general maintenance of the forest land and other responsibilities.

Table 9
FEDERAL LAWS RELATING TO WATER QUALITY FROM 1976 CATALOG OF FEDERAL DOMESTIC ASSISTANCE

Title	Federal Agency	Authorization	Objectives and Uses And Use Restrictions	Types of Assistance
Irrigation, drainage & other soil & water conservation loans	Farmers Home Adm. Dept of Agriculture	Consolidated Farm & Rural Development Act, Sect. 306, Public Law 92-419, 7 USC 1926	To increase income of farm families and other rural residents and to readjust the use of land so that each acre is used for a purpose which will better serve the community. Loans may be made to eligible applicants for irrigation, drainage, or other soil conservation measurers	Guaranteed insured Loans
Rural housing site loans	Farmers Home Adm Dept. of Agriculture	Housing Act of 1949 as amended, Sect 523 and 524; Public Law 89-117 and Public Law 89-754; 42 USC 149 oc and USC 149 od.	To acquire and develop land in rural areas to be subdivided as adequate building sites, including necessary equipment which becomes a permanent part of the development and for water and sewer facilities if not available.	Direct Loans, guaranteed, insured loans.
Soil and water loans	Farmers Home Adm Dept of Agriculture	Consolidated Farm & Rural Development Act, subtitle A, Sect 304, Public Law 92-419; 7 USC 1924	To facilitate improvement, protection, and proper use of farmland by providing adequate financing and supervisory assistance for soil conservation; water development, conservation and use; forestration; drainage of farmland; etc.	Guaranteed insured Loans
Water and waste disposal systems for rural communities	Farmers Home Adm Dept of Agriculture	Consolidated Farm & Rural Development Act, Sect 306, Public Law 92-419; 7 USC 1926	Meeting the need for new and improved rural water and waste disposal systems; the installation, repair, improvement, or expansion of a rural disposal system including the collection, and treatment of sanitation, storm, and solid wastes.	Guaranteed insured loan; project grants

Table 9 (Continued)

Title	Federal Agency	Authorization	Objectives and Uses And Use Restrictions	Types of Assistance
Watershed Projection and flood prevention loans	Farmers Home Adm Dept of Agriculture	Watershed Protection & Flood Prevention Act, as amended,Public Law 83-566;Sec 8, 16 USC 1oo6a	To help local sponsors provide the local share of the cost of watershed works of improvement for flood prevention, irrigation, drainage, water quality management, sedimentation control...	Guaranteed insured loans
Resource conservation and development	Soil Conservation Service, Dept of Agriculture	Soil Conservation & Domestic Allotment Act; P.L.74-46 as amended by P.L.87-703;Bankhead Jones Farm Tenant Act; P.L.75-210;as amended by P.L.89-796;P.L.91-343;and P.L.92-419	Installation of land conservation and utilization works of improvement... works of improvement may include measures serving purposes such as flood prevention, sedimentation and erosion control...agricultural water management purposes, rural community water supply, water quality management, control and abatement of agriculture-related pollution, disposal of solid wastes,...	Project grants, advisory services and counseling
Watershed protection and flood prevention	Soil Conservation Service, Dept of Agriculture	Watershed Protection & Flood Prevention Act; Public Law 83-566,68 stat.666;Public Law 84-1018,70 stat.1088;P.L. 85-624,72 stat.563; P.L.85-865,72 stat. 1605;P.L.86-468, 74 stat.131,132;P.L.86-545,74 stat.254, P.L. 87-170,75 stat.408, P.L.87-703,75 stat.608 P.L.89-337,79 stat. 1300,P.L.90-361,82 stat. 667;P.L. 93-251,88 stat. 15	Assistance is provided in planning, designing, and installing watershed works of improvement; in sharing project grants costs of flood prevention, irrigation, drainage, sedimentation control...	Project grants

Table 9 (Continued)

Title	Federal Agency	Authorization	Objectives and Uses and Use Restrictions	Types of Assistance
Economic development-grants & loans for Public Works and Development facilities	Economic Development Adm, Dept of Commerce	Public Works & Economic Development Act of 1965; P.L.89-136 as amended by 90-103,91-123,91-304,92-65,93-46, and 93-423;42 USC 3131,3132,3135,3153, 3171	To assist in the construction of public facilities needed to initiate and encourage long-term economic growth...grants for such public facilities as water and sewer systems... port facilities...flood control projects...	Project grants; direct loans
New Communities-Loan Guarantees	Community Planning & Development, Dept of Housing & Urban Development	Title VII,Housing & Urban Development Act of 1970(Urban Growth & New Community Development Act of 1970); P.L. 91-609, & Title IV of The Housing & Urban Development Act of 1968	To encourage the development of well-planned, diversified, and economically sound new communities, including major additions of existing communities. Eligible costs for land development include...installing and construction water lines and water supply systems, sewage...drainage facilities...	Guarantee insured loans
Community Development Block Grants/Entitlement Grants	Community Planning & Development, Dept of Housing & Urban Development	Title I of the Housing & Community Development Act of 1974, P.L.93-383, 42 USC 5301-5317	The Block Grant Program consolidates seven former community development type categorical programs, including...open space land...the basic water and sewer facilities program, public facilities loans...	Formula grants
Water Pollution Control Loans	Small Business Administration	Small Bus. Act, as amended, Sect 7 (g), P.L. 92-500, 15 JSC 636	To assist small business concerns... provides assistance in making additions to or alterations in the equipment, facilities (including the construction of pretreatment of facilities and interceptor sewers), or methods of operation to comply with water pollution control requirements established under the Federal Water Pollution Control Act.	Direct loans; guaranteed insured loans

Table 9 (Continued)

Title	Federal Agency	Authorization	Objectives and Uses and Use Restrictions	Types of Assistance
Construction grants for waste water treatment works	Office of Water & Hazardous Materials, USEPA	Title II of the Federal Water Pollution Control Act, as amended; P.L. 92-500; 33 USC, 1281 (g) (1)	To assist and serve as an incentive in construction of Municipal Sewage Treatment works...such works may serve all or portions of individual communities, metropolitan areas, or regions. A project may include, but may not be limited to, treatment of industrial wastes...the grantee must initiate an acceptable system of user charges, and in addition, recover capital costs, insofar as they are associated with the treatment of industrial wastes.	Project grants
Water Quality Control Monitoring Assistance (storet system)	Office of Water & Hazardous Materials, USEPA	Sec 104 (b) (1) and 104 (b) (6) of the Federal Water Pollution Control Act, as amended; P.L.92-500, 33 USC 1254 (b) (1) and 1254 (b) (6)	To assist Federal, State, interest or local authorities in control or prevention of water pollution through application of monitoring and data technology beyond the limitations of their own resources.	Advisory services and counseling; dissemination of technical information; provision of specialized services
Water Pollution Control-Area Wide Waste Treatment Management Planning Grants	Office of Water and Hazardous Materials, USEPA	Federal Water Pollution Control Act, Amendments of 1972, Sec 208, P.L. 92-500; 33 USC 1288	To encourage and facilitate the development and implementation of area wide waste treatment management plans in designated areas.	Project grants

Table 9 (Continued)

Title	Federal Agency	Authorization	Objectives and Uses and Use Restrictions	Types of Assistance
Water Pollution Control Loans	Office of Water & Hazardous Materials, USEPA and small business adm.	Federal Water Pollution Control Act, amendments of 1972, Sec 8, P.L.92-500; which amends Sec 7 of the small Bus. Act, 15 USC 636.	Funds are provided to qualified small business for use in purchasing and establishing such additions, alterations, or changes in method as are necessary and adequate to comply with pollution control requirements established under this act.	Direct loans
Environmental Protection Consolidated Grants special purpose	Grants Adm Div, Office of Planning & Management, Environmental Protection Agency	Federal Water Pollution Control Act, Amendments of 1972, P.L.92-500, also P.L.'s on other USEPA concerns, 91-604, 89-272, 91-512,93-523	To consolidate special purpose grants as an alternative grant mechanism which will provide the ability to consolidate into one grant instrument grants awarded separately for specific and definite environmental protection activities. Grant funds may be used for costs specifically incurred in the conduct of environmental projects in accordance with the purpose enumerated in the approved application.	Grants

Table 10
FEDERAL LAWS THAT MIGHT BE USED TO REDUCE WATER POLLUTION FROM NONPOINT SOURCES

Act	Federal Agency	Objectives and Uses and Use Restrictions
Federal Environmental Pesticide Control Act of 1972	USEPA	Requires registration of pesticides with USEPA; EPA promulgates rules and regulations; includes National Monitoring Plan with Federal, State, or Local agencies for soil and water monitoring; may delegate enforcement powers to States; may confiscate pesticides or cancer registration.
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 1964	USEPA	Requires registration of pesticide with USEPA; EPA promulgates rules and regulations; may delegate enforcement powers to States; may confiscate pesticides or cancer registration.
Grazing Land Chapter of Public Lands Title 1974	Interior	Leases grazing privileges on vacant, unreserved unappropriated lands; may refuse to review a permit.
Forest Service and Management Chapter of the Conservation Title Code 1974	Agriculture	Issues permits for grazing on national forest lands.
Environmental Protection Section of Transportation Title 1974	Transportation	Requires environmental impact statement; alternatives to the proposed; does not regulate post approval conduct or penalize violators.
Federal and Highways Act 1966	Transportation	Issues guidelines for minimizing soil erosion from any federally aided highway construction; does not regulate post approval conduct or penalize violators.
National Forest Chapter U.S. Code 1974	Agriculture	Permits cutting of merchantable timber only if the cutting will not detrimentally affect the purity of the water supply.

Table 10 (Continued)

Act	Federal Agency	Objectives and Uses and Use Restrictions
U.S. Code 1974	Interior	Persons cutting timber from patented or leased lands in a number of National Parks and Battlegrounds are subject to rules and regulations to prevent soil erosion.
Sustained Yield Forest Management Act 1974	Agriculture	Empowers Secretaries of Agriculture and Interior that private owners maintain water supply regulations of stream flow and prevention of soil erosion.
	Interior	U.S. Agency action is the primary enforcement method afforded.
Soil Conservation and Domestic Allotment Act 1974	Agriculture	Conforms with state and local laws restricting land use and preventing soil erosion. Aid may be given to other agencies and local governments in return for their treatment or use of land for soil conservation. Soil conservation on federal lands is to be carried out by the Secretary.
Rural Environmental Conservation Program Act 1974	Agriculture	Gives contractual and purchasing authority to Secretary of Agriculture to carry out Soil Conservation and Domestic Allotment Act 1974.
Watershed Protection and Flood Prevention Act 1974	Agriculture	Prevents erosion, floodwater, and sediment damages in watersheds, furthering conservation, development, utilization and disposal of water, and the conservation and utilization of land. The Secretary of Agriculture may enter into cooperative agreements with local organizations, land owners, or land operators for them to carry out cropping systems, land use soil and water conservation practices. The Secretary is authorized to show the cost of such measures.
Croplands Adjustment Act 1973	Agriculture	Grant contractual authority to the Secretary of Agriculture to enter into agreements for a term of years with agricultural procedures whereby in return for Federal Financial Assistance, producers would take preventive measures pertaining to soil erosion and minimize water pollution from agricultural activities.

Table 10 (Continued)

Act	Federal Agency	Objectives and Uses and Use Restrictions
Agricultural Credit Chapter-U.S. Code 1973	Agriculture	Public and Quasi-Public Agencies wishing to establish soil conservation practices and develop drainage and waste disposal facilities may apply to the Secretary of Agriculture for grants. The State Water Pollution Control Agency must certify that contaminant levels in excess of state standards will not result from proposed facilities or practices. The Secretary of Agriculture may offer loans to farm owners or farm tenants who agree to develop, conserve, and properly use their land and water resources.
Bankhead - Jones Farm Tenant Act 1964	Agriculture	Allows loans to be made to Federal, State, and Local organizations and agencies to assist them in enacting plans for the Conservation of Soil and Water Resources. Loans may be used for installing measures and facilities for water quality management and for the control and abatement of agriculture related pollution.
Soil and Water Conservation Expenditures Provision of Internal Revenue Code 1967	IRS	Allows tax payers engaged in the business of farming to take an income tax deduction for expenditures included for Soil and Water Conservation measurers.
Flood Disaster Protection Act 1973	HUD	Encourages flood prevention measures through rules and regulations issued by the Secretary of HUD to require that states and localities receiving Federal Reconstruction Funds for flood damage adopt adequate flood plain ordinance.
Flood Control Act 1974	Agriculture Army	Army is to plan, investigate, improve flood control; while improvement of watersheds and measures for the retardation of runoff, water flow and soil erosion on watersheds are to be carried out by the Department of Agriculture.
Watershed Protection and Flood Protection Act 1974	Agriculture	Secretary of Agriculture enter into agreements providing direct financial assistance to local organizations and individual land owners or operators who agree to practice soil and water conservation.

Table 10 (Continued)

Act	Federal Agency	Objectives and Uses and Use Restrictions
Rural Environmental Conservation Program 1974	Agriculture	Requires that all conservation contracts between the Secretary of Agriculture and eligible owners and operators of land include a provision forbidding the destruction of the character of an area as wetland.
Water Bank Program For Wetlands Preservation Act 1974	Agriculture	Reduce runoff, soil and wind erosion and to contribute to improved water quality and reduce stream sedimentation. May share costs of landowners wetlands conservation measures. The Secretary must coordinate the program with wetland programs administered by the Department of Interior.
Soil and Water Resources Conservation Act of 1977 (16 USCA PL 95-192)		
Surface Mining Control and Reclamation Act of 1977 (PL 95-87)	Office of Surface Mining	To control environmental impacts of coal mining, and provide consistency in the area of mining by application of a nationwide program. Also establish tax to generate monies to correct damage caused by past mining activities.
Sustained Yield Forest Management Act (16 USCA, 583, 51 (1) 1974)		

U.S. Soil Conservation Service, Department of Agriculture: The "SCS" is the primary functioning agency which provides services to farm operators in the areas of soil analysis, land and water conservation, soil erosion control, and crop management. These services and others are provided by trained professionals working in each county. Their work can influence the use of agricultural land and water quality.

U.S. Agricultural Stabilization Conservation Service, Department of Agriculture: This agency's chief responsiblities are to manage and distribute federal funds to farm operators through several USDA programs, including the Agricultural Conservation Program (ACP) and the Crop Subsidy Program. Through these programs, erosion and land management programs can be implemented in agricultural areas, thereby improving agricultural land.

U.S. Farmers Home Administration, Department of Agriculture: The FHA agency offices are located in most counties and deal primarily with the local governments and rural residents in administering several federal programs. Four programs, as outlined in the previous tables, are administered by FHA in the areas of water supply and wastewater systems: rural housing, including acquisition and development of land, and irrigation, drainage, and soil and water conservation. Much of the work of "local" FHA personnel is to determine utility system or housing needs, based upon established criteria, and then to provide funds in the form of loans and grants to develop water systems, sewerage systems, and housing projects in rural areas. Therefore, through the development of water and sewer facilities and relatively small housing projects in rural areas, the FHA's work has improved land use conditions and has caused some rural cluster and strip developments to become more livable and more attractive for continued growth.

U.S. Corps of Engineers: Although this agency does not maintain any main offices in the 208 area, it does provide a small staff in the area for the purpose of maintaining existing dams and reservoirs originally constructed by the Corps. The earlier projects of the Corps of Engineers have had a tremendous effect on land use. In the 208 area, Rend Lake was developed by the Corps, thus impounding lands which were once agricultural, wooded, and even urban uses.

The construction of the Rend Lake dam and reservoir was one of the Corp's latest projects in Southern Illinois. It was a multi-purpose project, made operational in 1972, but also contains several recreational areas which have been completed more recently. Fifty-five area communities are using Rend Lake for their water supply, and others are benefiting from flood control provided by the impoundment. (Rend Lake, the largest lake in the 208 area, has 18,900 surface acres, with a normal pool length of 13 miles and width of 3 miles. It offers camping, boating, water sports, fishing, and hunting.)

U.S. Environmental Protection Agency: This agency does not maintain an area office, but works in conjunction with the Illinois EPA, which maintains staff in the 208 area. The USEPA monitors all point sources of pollution entities through this arrangement. The IEPA issues all NPDES (National Pollution Discharge Elimination System) permits to point source entities, including municipal, industrial, mining, and others, based upon the entity's ability to meet water quality standards. This system can greatly affect land use, because it can distinguish those areas of land use which are emitting sub-standard effluents from those that are not. Thus, the discharge operations from lands where substandard effluents are being discharged can be terminated, and the land can be restricted to agricultural or other nonpoint use. The Knox-Hirons Livestock Facility was a point source operation in the 208 area that was closed by IEPA.

U.S. Office of Surface Mining Reclamation and Enforcement, Department of Interior: This is a new office within the Department of Interior, established in 1977, under PL 95-87; it is responsible for monitoring and managing surface mining control and reclamation. An area office has not, at this writing, been set up in Southern Illinois; but a spokesman from "OSM" has indicated that field personnel will be working in Southern Illinois, operating from a federal/regional office in Indianapolis or Louisville.

The chief purpose of this new federal agency will be to control current and future surface mining reclamation; to control acid mine drainage from preparation plant discharges, gob piles, and slurry ponds; and to assist in acquisition and reclamation of abandoned, unreclaimed mine sites. Therefore, the Office of Surface Mining Reclamation and Enforcement will have a strong and positive effect on all lands used for mining in the 208 area. In time, all mine-disturbed lands, as well as acid drainage source lands, should be converted back as nearly as possible to their original use and contour, or to another acceptable land use design. (The projected land use in chapter four takes the reclamation concept into account.)

U.S. Department of Transportation: Through its highway subsidization programs, this agency effects a very real, and sometimes questionable, change to local land use patterns.

In some portions of the 208 area, small strips of residential development were acquired by purchase or eminant domain to make way for Interstate 57. Interchanges have used up numerous acres of prime farm land. These items, plus the acquisition of rights of way, have been accomplished with federal funds, derived in part from the U.S. Department of Transportation. Funds from "DOT" have resulted in easier and faster travel to surrounding large cities. Another consequence, is new land use patterns have occurred in portions of the 208 area.

U.S. Department of Housing and Urban Development: HUD, though not maintaining a main office in the 208 area, does have an impact on land use patterns in portions of the 208 area. Its programs can and do affect land use in several ways. In some of the area's municipalities, new low and medium income housing, as well as housing for the elderly, has replaced deteriorated housing and vacant lots. Some examples of such new housing may be found in Carbondale, Murphysboro, Benton, Mount Vernon, and several other communities in the area. HUD has also provided funds to some municipalities for water supply and sanitary sewer facilities. By upgrading or expanding a municipality's utility system, a greater demand for development is assured. In addition, HUD administers the Flood Disaster Protection Act, which encourages local units of government to adopt a floodplain ordinance which restricts future land use development on floodplains and provides disaster relief funds.

The federal agencies discussed above have had an effect on local land use in some other ways, and often in a more indirect manner.

It should be understood that the impacts which are made on local land use through federal assistance programs have almost always been on a site-specific basis or in a delineated area which can be illustrated by a boundary. To date, there has been no federal or state legislation passed which mandates that specific land use plans and policies be developed or that land use controls and regulations be implemented which would include all of the jurisdictional area of municipalities or counties. Similar legislation has been introduced in Congress in recent years.

State governments, perhaps in every state, have provided the necessary enabling legislation which permits local, general purpose units of government to adopt ordinances which create planning commissions, adopt land use plans, and adopt and implement zoning and subdivision regulations. In Illinois, all of these tools are implementable by counties and municipalities, as a result of legislative action taken many years ago. Yet only a relatively small percentage of local units have taken advantage of these opportunities. For sources of legislative research from the Illinois Revised Statutes, 1975 refer to Table 4, of the 208 publication, Management Analysis: A Staff Report, Dec., 1976.

State Agencies and Programs

As in the case of federal government agencies, several state agencies and programs can affect land use patterns, either in a direct or an indirect manner. Many of the state agencies have developed a posture regarding land use which is the same or similar to that of its federal agency counterpart. However, the precise role of state agencies may differ from that of its federal counterpart because of policy and funding differences. Since there are some similarities, the following narrative covering state agency relationships to land use will be brief and to the point.

Illinois Pollution Control Agencies: Three agencies were created by the Illinois Environmental Protection Act (Illinois Revised Statutes, Chapter 111½, Section 1001, 1970). These agencies are the Environmental Protection Agency (EPA), the Pollution Control Board (PCB), and the Institute for Natural Resources (INR). The EPA monitors, investigates, and presents evidence at hearings before the Pollution Control Board. The PCB serves as rule-maker and adjudicator. The INR is responsible for long-range research and planning. In the following narrative, the activities of these agencies are briefly described as they relate to land use control.

One primary function of the state pollution control agencies is to control and abate pollution in Illinois waters. In accomplishing this task, the polluting lands and facilities must be examined and appraised and, if necessary, changed and upgraded.

> The Pollution Control Board has adopted rules and regulations on plans for sewage works, the quality of streams, the filling or sealing of abandoned water wells and holes, the discharge of mercury, and others. It has broad authority to adopt reasonable rules and regulations as may be necessary.
>
> A permit is required for the following: (1) the installation or operation of any sewage works; (2) the increase in volume or strength of any wastes into the waters of the states; (3) the construction or operation of any equipment or facility that would contribute to water pollution; and (4) the construction or use of any new outlet for the discharge of any wastes directly into the waters of the state...
>
> The state Environmental Protection Agency may investigate any alleged act of pollution. When it appears that there has been a violation, the Agency may file a complaint before the Pollution Control Board...[1]

Illinois Department of Conservation: This department has the power to take such measures as are necessary to prevent pollution and create sanitary conditions in rivers, lakes, and streams. In order to accomplish this the Department is interested in trying to control the land use from which sub-standard pollutants are occurring.

> The Department objectives include the promotion and protection of flora, fauna, and fish. The Department may acquire an interest in real property to preserve, through limitation of future use, areas of great natural scenic beauty or areas whose natural conditions or present state of use would maintain or enhance the conservation of natural or scenic resources. This acquisition power includes water resources.
>
> The Department is authorized to cooperate with the pollution control agencies in making pollution investigations...[2]

Illinois Department of Public Health: This Department may make sanitary investigations as it may deem necessary, from time to time, for the preservation and improvement of public health. In doing this, the Department is interested not only in the sanitation facilities, but also in the potential pollution from land uses on which sub-standard facilities or pollution generating facilities may exist.

> [The Department] may make such sanitary investigations as it may from time to time deem necessary for the preservation and improvement of public health. It adopts rules and regulations reasonably necessary to effectuate the policy of the Water Well Construction Code as it applies to wells furnishing water to fewer than ten properties. These rules and regulations provide criteria for the proper location and construction of any water well...[3]

By establishing rules and regulations, and providing criteria for the location and construction of wells, the Department can influence land use: particularly the density of residential or industrial uses which are dependent upon water wells for water supply.

Illinois Department of Mines and Minerals: Although this Department's thrust is toward mines and minerals, it has the function of preventing damage to the underground water supply. This function relates directly to the use of land on the surface, although the intent, here, is not so much to regulate land use as to regulate the potential pollution from particular uses, such as mining.

> Any well drilled for water that is abandoned must be plugged. Notification of intent to drill any water well must be filed with the Mining Board and, in the case of wells drilled for water that penetrate the subsurface below the glacial drift, a permit must be obtained...
>
> The State Mining Board also regulates the disposal of salt or sulfur-bearing water and any oil-field waste produced in the operation of oil and gas wells, and has authority to adopt proper rules and regulations...[4]

Illinois Department of Agriculture: Although this Department holds an interest in all types of Agricultural Land Use, its concerns are also in production, agricultural economy, erosion, and conservation of land. It functions as a lead agency to county Soil and Water Conservation Districts; in so doing, it is interested in agricultural erosion/sedimentation land use control. It may also become the catalyst in converting approximately 20% of Illinois' share of federal mine reclamation funds to local districts in order to conserve and reclaim abandoned mine lands to agricultural, forest, or recreational uses.

Illinois Department of Transportation: This agency has general supervision of every public body of water in the state. It assures that no body of water is wrongfully encroached upon, seized, or used by any private interest in any way, except as provided by law. The use of land around such public water bodies, and the activities on the land, are of interest to the Department.

> It is unlawful to make any fill or deposit of rock, earth, sand, or other material or any refuse matter of any kind in the public bodies of water in the state without first submitting the plans to the Department of Transportation and receiving a permit. When a permit is sought for a fill or deposit in a slip, the Department requires a signed statement approving such action by all riparian owners whose access to public waters will be directly affected...[5]

Local Agencies and Programs

Each of the following local, general, or special purpose governments have some degree of impact on land use; however, it is primarily the counties and municipalities which actually have the power to adopt and implement the land use controls and regulations.

The local units with some degree of land use control capability are counties, municipalities, river conservancy districts, water districts, sanitary (sewer) districts, and soil and water conservation districts.

Except for counties and municipalities, the major land use-related function of each of the above governmental units in the 208 area are as follows:

River Conservancy Districts: These Districts have a particular jurisdiction over which they manage pollution prevention, regulation of water flow, and protection of water supply sources. In the agreements between the Districts and the users, such as municipalities and Water Districts, the District may have some control of growth and land use development. It may also effectuate controls over pollution of adjacent land uses.

Water Districts: The Water Districts in the 208 area are created to distribute water supply to a given rural area delineated by its boundaries. In many instances, residential sprawl has occurred along rural roads where the District exists, and usually the dwellings are not interlinked with a central sewage system. Thus, either a septic tank and drainage field, or a small lagoon, is used. Public sewage systems have not, traditionally, been installed in the 208 area Water Districts. Operators of public water supply systems have the power to protect their water supplies from upstream pollution sources.

Sanitary (Sewer) Districts: These districts are generally intended to be developed to furnish unincorporated areas with a central sanitary sewage system, either by providing its own treatment facility or by contracting with a nearby municipality to treat and dispose of the waste. Development of such Districts in built-up or developing areas would be an inducement to land development and could better assure cluster development rather than sprawl.

Soil and Water Conservation Districts: These Districts are particularly interested in the conservation of land and water, as their name implies. They are interested primarily in the agricultural land uses, although in recent years, they have become involved with other uses, particularly those which contribute pollution to area lakes and streams. While these Districts work to control erosion and promote conservation, they do not initiate ordinances to control land use.

Counties and Municipalities: Both of these units of government are general purpose bodies. They each have powers to adopt and implement land use controls. The following section will describe several tools in addition to Land Use Plans, Zoning Ordinances, Subdivision Regulations, and Building Codes, which could be used by municipalities, and in some instances counties, in order to implement more indirect land use control measures.

Indirect Land Use Control Techniques

In the previous discussions. it has been pointed out that many federal, state, and local governments may use certain expressed or implied powers to control lands within its jurisdictional area for purposes of abating or controlling water pollution, and for other specific purposes. It has also been shown that none of the governmental entities, except for the local general purpose governments such as counties and municipalities, have the authority and capability to adopt and implement broad categorical land use controls which would cover the entire 208 area.

This section of chapter six is intended to describe briefly several indirect measures which can be taken by such local general purpose governmental (or by the state) beyond the planning, zoning, subdivision regulation concepts of land use control.

Annexation

"Annexation is defined as the act of attaching, adding, joining, or uniting one thing to another; generally spoken of as the connection of a smaller or subordinate thing with a larger or principal thing."[6] In Illinois a municipality may annex adjacent unincorporated territory, particularly if a built-up area, by following the proper legal procedure to do so. (See Illinois Revised Statutes, 1975, Chapter 24/7-1-1) This action could be used to apply municipal zoning or subdivision regulations to a larger area.

Extra Territorium: Extra-Territorial Powers

Extra Territorium is defined as "beyond or without the territory;" and "outside the territorial limits of a state"[7] (or municipality). In Illinois a municipality may exercise extra-territorial powers for a distance of 1½ miles beyond its site corporate boundary, with respect to land use controls such as zoning, provided that it adopts the proper ordinances and initiates zoning. (See Illinois Revised Statutes, 1975, Chapter 24/11-13-1)

Eminent Domain

Eminent Domain is defined as "the power to take private property for public use" (Mac Veah v. Mutonomah County, Or).[8] "The right of eminent domain is the right of the state, through its regular organization, to reassert, either temporarily or permanently, its dominion over any soil of the state on account of public exigency and for the public good."[9]

In Illinois, the state may implement eminent domain wherever and whenever it is required. In the 208 area it may be needed to claim and reclaim abandoned surface mine lands, or in the construction of public highways or reservoirs, or for other public facilities. Thus, the change in land use can occur through this process. (See Illinois Revised Statutes, 1975, Chapter 47/1 et. seq.) Eminent domain may also be implemented by municipalities (See Illinois Revised Statutes, 1975, Chapter 24/11-61-1 and 2); or by counties (See I.R.S., 1975, Chapter 121/6-309).

Incompatible: Incompatible Land Use

An incompatible land use is a term used in zoning where, for example, a commercial use or other use is located in a "noncompatible" district such as a residential use. Such land uses are incompatible, and they are restricted from the residentially zoned district, unless they existed and were operating before the ordinance became effective. (See Illinois Revised Statutes, Chapter 24/11-13-1 et.seq.) Incompatible uses, where zoning is in effect may be phased out if they discontinue operation, have burned down, or have otherwise been destroyed, thus making the land use more compatible in a particularly zoned district.

Reevaluation - Reassessment

Reevaluation - reassessment is a process of changing either or both the valuation of property or the tax assessment of it. It is sometimes conducted for an entire county (with supervision of the state), and it is usually done to increase the value of some properties which are being taxed on the basis of an old, outdated and relatively small valuation. The value may be increased, while the assessment rate may remain constant; but in such case the tax assessment would become greater on a particular parcel of land. The opposite may also occur. Changes in either evaluation or assessment could cause some properties to change in land use.

Land Clearance for Redevelopment

Land clearance is sometimes the third phase in a land redevelopment project, following the planning phase and the relocation phase. This practice, historically used by the former HHFA and the current DHUD agencies, in federal housing projects. During the process of contacting residents in the planning area, which is usually a deteriorating one, those which may not be acquired at a fair, appraised market value may require the implementation of eminent domain to acquire the land for the project. In either case, the land is being upgraded, and in some instances there is a land use change. (See Illinois Revised Statutes, Chapter 67½ for Land Clearance Act, and Land Clearance Commission)

Tax Incentives

Tax incentives are often an encouragement to those who acquire land in rural counties. The lands may be considerably lower in valuation and in assessment rate, because utilities do not serve the area as they do in the municipality. Some citizens, however, overlook the added costs of installing a septic system or drilling a well when purchasing such land. Lower property taxes as well as lower land costs encourage the purchase of rural land, particularly along county roads for residential development. This contributes to the creation of urban sprawl.

Tax incentives can be used by counties in a positive way. The counties could provide, through a re-evaluation process, tax incentives to mines which properly reclaim the land, or to agencies which reclaim abandoned, unreclaimed mine lands.

Tax Penalties

Tax penalties theoretically may be implemented by counties on improperly maintained lands or facilities on the land. Such penalties could work in reverse of the policy stated above concerning tax incentives. Where individual land owners, mines, or industries have poorly maintained the land or have caused substantial pollution to area waters, a tax penalty could be imposed. Thus, to avoid tax penalties or other penalties, the land owner would be induced to upgrade the use of his land.

Land Banks: Land Banking

Land banking is often applied in municipalities where unreclaimed property exists, or where there has been a failure of the owner to pay back taxes on his land. Other instances may also occur where the disposition of a parcel of land may cause it to become acquired and held by a "land bank." (In this sense, the term "land bank" may be applicable to a banking or financial organization.) For further information on land banks or unclaimed property, refer to the Illinois Revised Statutes, 1975, Chapter 14. (Also, see the Uniform Disposition of Unclaimed Property Act, Sale of Personal Property by Lien Holders, Chapter 14, Paragraph 1-130.)

Changes in ownership of land, particularly in instances where abandoned lands have been converted to new owners, can cause a change in land use or rehabilitation of the existing use. Such land banking practices if properly conducted, could be used to upgrade applicable lands in rural as well as municipal areas.

Permits

Permits of various kinds, which are required by law in order for structures and other facilities (those to be developed, or already in existence) on parcels of land, are a means of controlling the use of the land, the facilities located on the land, and the performance of such facilities. By definition (as applied here) a permit is "a written license or warrant, issued by a person in authority, empowering the grantee to do some act not forbidden by law, but not allowable without such authority."[10]

Permits are required in the 208 area for the construction, operation, disposal, etc., of a number of activities which affect the land; they are, therefore, a control device for the use of land. Some land use activities usually requiring permits are mining, reclamation measures, building construction, solid waste disposal, and point source discharges. Thus, the various permitting systems have an effect on land use and the condition of downstream bodies of water receiving runoff and effluent discharges.

Utility Supply and Distribution System Controls

Utilities which are primarily suppliers of water to area residents, such as River Conservancy Districts, municipalities, and Public Water Districts, sometimes operate without concern for the disposal of wastewater. Almost all sanitary sewage facilities, except those in municipalities which have both water and sewer systems, are either privately owned septic systems, sand filters, or small sewage lagoons. If controls of wastewater systems were mandated through the legislative process, either before or simultaneously with development of new water distribution areas, the use of the land and of the receiving streams could be greatly enhanced.

Prime Farmland/Resource Conservation Districts

"Prime farmland is the available land that is best suited for producing food, forage, fiber, and oilseed crops. Such land may presently be in cropland, pasture land, forest land, or other uses, except that urban or built-up areas and water areas are not included. Prime farmland has the soils qualities and moisture supply to produce sustained high yields of crops, when it is adequately treated and managed. The land must be geographically located so that an adequate growing season exists for crop production. The identification of prime farmland is entirely related to soil characteristics and other physical criteria."[11]

It appears that "more precise planning data could be generated from county level General Soils Maps."[12] Such areas could be better delineated, mapped, and reserved as prime agricultural resource conservation districts. To accomplish this fully, new legislation, or another amendment to the existing Soil and Water Conservation Districts Law (See Illinois Revised Statutes, Chapter 5) is needed. If the appropriate legislation were enacted, surface mining on prime farm lands could be prohibited, thus conserving prime agricultural resources.

Intergovernmental Cooperation and Agreements

One of the most effective ways to control the use of land, with respect to wastewater systems and their interconnectability, is through intergovernmental cooperation and agreements.

> The term intergovernmental cooperation describes what happens when governments contract or agree to join together in some way to provide a service or facility for the benefit

> of their constituencies. Such kinds of cooperation are called either "joint agreements" or "contracts," and the experts clearly distinguish between the two. In a contract, one party furnishes services to one or more other parties. In a joint agreement all members, or a board created by them, participate in furnishing service. Both joint agreements and contracts have the same binding legal effect...
>
> The term "intergovernmental agreement" is used to refer to both contracts and joint agreements. Intergovernmental agreements encompass those instances in which 1) one local government or more performs or provides a service or facility for one or more other governments; 2) two or more local governments jointly perform a function or jointly operate a facility; 3) two or more local governments mutually assist one another in emergency situations; or 4) there exists a permanently formed organization whose main function is to address common problems and needs...
>
> Intergovernmental agreements have been around since colonial times. They were elevated to constitutional status in Illinois through the 1970 State Constitution. Statutory gloss was added to the constituional provision by passage of the Intergovernmental Cooperation Act three years later. There is no question that intergovernmental agreements have become important techniques for government planning and implementation...[13]

FOOTNOTES FOR CHAPTER 6

[1] N.G.P. Krausz, University of Illinois, College of Agriculture, Bulletin 741, Intergovernmental Arranagements for Water Use Regulation in Illinois, 1972, p. 27.

[2] Ibid., pp. 28-29.

[3] Ibid., p. 30.

[4] Ibid., p. 31.

[5] Ibid., p. 30.

[6] H. C. Black, M.A., Black's Law Dictionary, 1968, p. 115.

[7] Ibid., p. 616.

[8] Ibid.

[9] Ibid.

[10] Ibid. p. 1298.

[11] USDA, Soil Conservation Service, Prime Farmlands in Illinois, 1977, (a map illustration).

[12] Ibid.

[13] State of Illinois (DLGA and NIPC), Intergovernmental Cooperation in Illinois, March 1976, p. 2.

Chapter 7

SUMMARY AND RECOMMENDATIONS

Summary

Discussions within this report have pointed out that there is a relationship between land use and water quality. The identification of current land uses and the projection of future land uses are important components of the water quality planning process. As land use patterns change over time, changes will also occur in the type and quantity of water pollution attributable to a particular parcel of land.

Existing land uses within the ten county area have been identified and projection have been made of future land use patterns. These projections indicate an increase in the amount of land to be used for urban and mining activities. As activities in these two categories expand, land devoted to agricultural usage will decline. Decreases in agricultural land because of urban expansion will be permanent. Land which is changed from agricultural to mining usage is expected to be reclaimed and eventually return to agricultural production.

Local, state, and federal governments have a wide variety of powers and programs which could be used to improve water quality by controlling land use. However, most of these powers and programs are not currently being utilized to improve water quality. At the local level this is because most units of government in the area have not adopted the basic tools for use within their jurisdiction--land use plans, zoning ordinances, subdivision regulation ordinances, and building code ordinances.

Recommendations

The following recommendations are intended to provide tools, to the agencies called upon to adopt them, to assist in the effort of improving the overall water quality within the ten county area. The adoption of these recommendations will move the water quality planning process forward in an effective manner. These recommendations will assist the region in making the best use of authorities and programs available to them to improve water quality.

Counties and Municipalities

It is recommended that all counties and municipalities:

1) Adopt ordinances creating a planning and zoning commission.

2) Prepare, update, adopt and utilize official 20-year land use plans.

3) Adopt, implement, and enforce a zoning ordinance and zoning district map.

4) Adopt, implement, and enforce uniform subdivision regulation ordinances.

5) Adopt, implement, and enforce Building Codes and Plumbing Codes (preferably the BOCA Building and Plumbing Codes), and that single or joint units of government appoint building inspectors.

It is recommended that the following activities take place in relationship to county public health departments:

1) Installation of county health departments in Hamilton and Jefferson Counties or contract for these with established health departments from neighboring counties.

2) Addition of an Environmental Health Division in the Perry County Health Department or contract for these services with established environmental health divisions in neighboring counties.

3) Improved Staffing of Environmental Health Divisons in all area health departments.

4) Initiation of education programs for contractors, real estate agents, owners, loan establishments, and private system maintainance operators.

It is recommended that all counties initiate a process of identification of lands which might ultimately be desiganted as areas not to be mined under PL 95-87.

It is recommended that all municipalities with central sewage systems which propose to annex new areas of land, first develop a time schedule and capital improvement program for serving the area being annexed with water and sewer systems.

Public Water Systems

It is recommended that all public water systems identify land uses within the watershed of their water supplies which may constitute hazards to their water supplies.

Soil and Water Conservation Districts

It is recommended that all County Soil and Water Conservation Districts accept primary responsibility for managing erosion control in rural areas, and, in so doing, develop and implement workable erosion control plans which provide priority to water supply reservoir watersheds.

It is recommended that each County Soil and Water Conservation District prepare and adopt map illustrations, policies, and plans which delineate and describe controls and methods of conserving prime agricultural lands.

It is recommended that counties and Soil and Water Conservation Districts enter into formal agreements to develop, cooperate, coordinate, and maintain a unified, ongoing system of monitoring all coal mining, reclamation, effluent discharge, mine waste treatment, and waste disposal.

It is recommended that all local governments and agencies cooperate and coordinate with S&WC Districts and Counties in the processes of monitoring mine reclamation and mine waste treatment and disposal, wherever practical and feasible.

Other

It is recommended that education programs be developed to assure proper sizing, construction, installation, and maintainence of rural sewage systems either by the Extension Service by USDA agencies, and/or in area school districts.

It is recommended that the state legislature provide new, improved legislation which would assure that acceptable, approvable 1 - 20 unit sewage systems be developed, particularly in all rural areas served by public water supply systems, and in municipalities.

APPENDIX

Table 11
LAND USE, BUILDING, AND SEWER ORDINANCES ADOPTED IN 208 AREA COUNTIES AND MUNICIPALITIES

Name of County or Municipality	Adopted Zoning Ordinance	Adopted Subdivision Regulations Ordinance	Adopted Building Code Ordinance	Adopted Sanitary Sewer Ordinance
Franklin County	None	None	None	None
Gallatin County	None	None	Yes N/A	None
Hamilton County	None	None	None	None
Hardin County	None	None	None	None
Jackson County	None	Yes 1969	None	Yes 1975
Jefferson County	None	Yes N/A	None	None
Perry County	None	Yes N/A	Permit System	None
Pope County	None	None	Yes N/A	None
Saline County	None	Yes N/A	None	Yes N/A
Williamson County	None	None	None	None
Ava	None	None	None	Yes N/A
Belle Prairie City	None	None	None	None
Belle Rive	Yes 4/20/70	Yes 4/20/70	Yes 4/30/70	None
Benton	Yes 5/27/65	Yes 5/1/72	Yes 1/20/69	None
Bluford	Yes 5/2/66	None	Yes 2/4/74	Yes 3/11/75
Bonnie	None	None	None	Yes N/A
Broughton	None	None	Yes N/A	None
Buckner	None	None	None	None
Bush	None	None	None	None
Cambria	None	None	None	Yes N/A
Campbell Hill	Yes N/A	None	None	Yes N/A
Carbondale	Yes N/A	Yes N/A	Yes N/A	Yes N/A
Carrier Mills	None	None	None	Yes N/A
Carterville	Yes 7/15/69	Yes 6/4/74	Yes 3/5/63	Yes 6/4/74
Cave-In-Rock	N/A	N/A	N/A	N/A
Christopher	Yes N/A	None	Yes N/A	Yes N/A
Colp	None	None	Yes N/A	Yes N/A
Crainville	None	None	None	Yes N/A
Creal Springs	None	None	None	Yes N/A
Cutler	None	None	None	None
Dahlgren	None	None	None	Yes N/A
DeSoto	None	Yes N/A	Yes N/A	Yes N/A
Dix	None	Yes N/A	None	None
Dowell	None	None	None	None
DuQuoin	None	None	Yes N/A	Yes N/A
Eddyville	None	None	None	None
Eldorado	Yes N/A	None	Yes N/A	Yes N/A
Elizabethtown	Yes N/A	Yes N/A	Yes N/A	Yes N/A
Elkville	None	Yes N/A	Yes 11/11/63	Yes N/A
Energy	None	None	None	Yes 1963

Table 11
(Continued)

Name of County or Municipality	Adopted Zoning Ordinance	Adopted Subdivision Regulations Ordinance	Adopted Building Code Ordinance	Adopted Sanitary Sewer Ordinance
Equality	None	Yes N/A	None	None
Ewing	Yes 3/5/68	None	None	None
Freeman Spur	None	None	None	None
Galatia	None	None	Yes N/A	Yes N/A
Golconda	None	None	Yes N/A	Yes N/A
Gorham	None	None	None	Yes N/A
Grand Tower	None	None	Yes N/A	Yes N/A
Hamletsburg	None	None	None	None
Hanaford	None	None	None	None
Harrisburg	None	None	None	Yes N/A
Herrin	Yes N/A	Yes N/A	Yes N/A	Yes N/A
Hurst	None	None	Yes N/A	Yes N/A
Ina	Yes N/A	None	None	Yes N/A
Johnston City	Yes 10/26/64	Yes 7/13/64	Yes 4/16/63	Yes 12/3/62
Junction	Yes N/A	None	Yes N/A	None
Macedonia	None	None	None	None
Makanda	None	None	None	None
Marion	Yes N/A	Yes N/A	Yes N/A	Yes N/A
McLeansboro	None	None	None	None
Mt. Vernon	Yes 11/19/73	Yes 5/16/67	Yes 5/16/67	Yes 5/16/67
Muddy	Yes N/A	None	None	Yes N/A
Murphysboro	Yes 1965	Yes 1971	Yes 1965	Yes N/A
Nason	None	None	None	None
New Haven	Yes N/A	None	Yes N/A	None
North City	Yes N/A	None	None	None
Old Shawneetown	None	None	None	None
Omaha	None	None	None	None
Orient	None	None	None	None
Pinckneyville	None	None	None	Yes N/A
Pittsburg	None	None	None	None
Raleigh	None	None	None	None
Ridgway	None	None	None	Yes N/A
Rosiclare	None	None	Yes N/A	Yes N/A
Royalton	None	None	None	None
St. Johns	None	None	None	None
Sesser	Yes 4/28/65	Included in Zoning	Yes N/A	Yes 4/1/68
Shawneetown	Yes N/A	Yes N/A	Yes N/A	Yes N/A
Spillertown	None	None	None	None
Stonefort	None	None	None	None
Tamaroa	None	None	None	Yes N/A
Thompsonville	None	None	None	Yes 3/6/72
Urbain	N/A	N/A	N/A	N/A
Valier	Yes N/A	Yes N/A	Yes N/A	Yes N/A
Vergennes	None	None	None	None
Waltonville	None	None	None	None
West City	Yes 1970	Yes 1970	Yes 1970	Yes 8/4/75

Table 11
(Continued)

Name of County or Municipality	Adopted Zoning Ordinance	Adopted Subdivision Regulations Ordinance	Adopted Building Code Ordinance	Adopted Sanitary Sewer Ordinance
West Frankfort	Yes N/A	Yes N/A	Yes N/A	Yes N/A
Whiteash	None	None	None	None
Willisville	N/A	N/A	N/A	N/A
Woodlawn	None	None	None	Yes N/A
Zeigler	Yes 12/4/72	Covered in Zoning	Yes 4/15/63	Yes 9/16/71

LEGEND

Yes (Date) = Adopted Ordinance and date of adoption
Yes N/A = Adopted Ordinance, no date available
None = No Ordinance is in effect
N/A = No information available

Table 12
208 AREA ORDINANCES ADOPTED
Part 1

Population Covered by Adopted Ordinances 1976

		Population with Ordinance	% of Total	% of 208 Area Population Total
Municipalities				
Total Municipal Population	171,237			
Municipal Population with Zoning		119,992	70.0	48.0
Municipal Population with Subdivision Regulations		112,274	65.0	45.0
Municipal Population with Building Codes		141,935	83.0	56.0
Municipal Population with Sewer Ordinance		148,748	87.0	59.0
Counties				
Total Counties (Unincorporated) Population	80,977			
County Population with Zoning		0	0.0	0.0
County Population with Subdivision Regulations		40,684	50.0	16.0
County Population with Building Codes		6,189	8.0	2.0
County Population with Sewer Ordinances		19,968	25.0	8.0

Table 12
(Continued)
208 AREA ORDINANCE ADOPTED
Part 2

Number and Percent of Units with Ordinances, 1976

	Municipal		County	
	#	%	#	%
Total	81	---	10	---
Zoning	25	31.0	0	0.0
Subdivision Regulations	20	25.0	4	40.0
Building Codes	31	38.0	2	20.0
Sewer Ordinances	43	53.0	3	30.0